IMPERIAL COUNTY
AIR POLLUTION CONTROL DISTRICT

https://www.power-technology.com/projects/mount-signal-solar-power-plant-imperial-county-california/

May 20, 2014
Exceptional Event Documentation
For the Imperial County PM_{10} Nonattainment Area

FINAL REPORT

August 24, 2018

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ACRONYM	DESCRIPTIONS
AQI	Air Quality Index
AQS	Air Quality System
BACM	Best Available Control Measures
BAM 1020	Beta Attenuation Monitor Model 1020
BLM	United States Bureau of Land Management
BP	United States Border Patrol
CAA	Clean Air Act
CARB	California Air Resources Board
CMP	Conservation Management Practice
DCP	Dust Control Plan
DPR	California Department of Parks and Recreation
EER	Exceptional Events Rule
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GOES-W/E	Geostationary Operational Environmental Satellite (West/East)
HF	Historical Fluctuations
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory Model
ICAPCD	Imperial County Air Pollution Control District
ITCZ	Inter Tropical Convergence Zone
KBLH	Blythe Airport
KCZZ	Campo Airport
KIPL	Imperial County Airport
KNJK	El Centro Naval Air Station
KNYL/MCAS	Yuma Marine Corps Air Station
KPSP	Palm Springs International Airport
KTRM	Jacqueline Cochran Regional Airport (aka Desert Resorts Rgnl Airport)
LST	Local Standard Time
MMML/MXL	Mexicali, Mexico Airport
MPH	Miles Per Hour
MST	Mountain Standard Time
NAAQS	National Ambient Air Quality Standard
NCAR	National Center for Atmospheric Research
NCEI	National Centers for Environmental Information
NEAP	Natural Events Action Plan
NEXRAD	Next-Generation Radar
NOAA	National Oceanic and Atmospheric Administration
nRCP	Not Reasonably Controllable or Preventable
NWS	National Weather Service
PDT	Pacific Daylight Time
PM10	Particulate Matter less than 10 microns
PM2.5	Particulate Matter less than 2.5 microns

PST	Pacific Standard Time
QA/QC	Quality Assured and Quality Controlled
QCLCD	Quality Controlled Local Climatology Data
RACM	Reasonable Available Control Measure
RAWS	Remote Automated Weather Station
SIP	State Implementation Plan
SLAMS	State Local Ambient Air Monitoring Station
SMP	Smoke Management Plan

I Introduction

On May 20, 2014, State and Local Ambient Air Monitoring Station (SLAMS) located in Brawley (AQS Sites Code 060250007), California measured an exceedance of the National Ambient Air Quality Standard (NAAQS). The Federal Equivalent Method (FEM), Beta Attenuation Monitor Model 1020 (BAM 1020) measured a (midnight to midnight) 24-hr average Particulate Matter less than 10 microns (PM_{10}) concentration of 250 $\mu g/m^3$. PM_{10} 24-hr measurements measured above the 150 $\mu g/m^3$ are exceedances of the NAAQS. The SLAMS in Brawley was the only station, in Imperial County to measure an exceedance of the PM_{10} NAAQS on May 20, 2014.

TABLE 1-1
CONCENTRATIONS OF PM_{10} ON MAY 20, 2014

DATE	MONITORING SITE	AQS ID	POC(s)	HOURS	24-HOUR CONCENTRATION $\mu g/m^3$	PM_{10} NAAQS $\mu g/m^3$
5/20/2014	**Brawley**	**06-025-0007**	**3**	**24**	**250**	**150**
5/20/2014	Niland	06-025-4004	3	20	122	150

All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted[1]
May 20, 2014 was not a scheduled sampling day

The Imperial County Air Pollution Control District (ICAPCD) has been submitting PM_{10} data from Federal Reference Method (FRM) Size Selective Inlet (SSI) instruments since 1986 into the United States Environmental Protection Agency's (USEPA) Air Quality System (AQS). Prior to 2013 all continuous measured PM_{10} data was non-regulatory, thus measured in local conditions. However, by 2013 ICAPCD began formally submitting continuous FEM PM_{10} data from BAM 1020's into the USEPA managed AQS. Because regulatory consideration of reported data must be in standard conditions, as required by USEPA, all continuous PM_{10} data since 2013 is regulatory. On May 20, 2014, the Brawley monitor was impacted by elevated particulate matter caused by the entrainment of fugitive windblown dust from high winds generated by an upper-level trough that moved over southern California, including Imperial County.[2]

This report demonstrates that a naturally occurring event caused an exceedance observed on May 20, 2014, which elevated particulate matter and affected air quality. The report provides concentration-to-concentration monitoring site analyses supporting a clear causal relationship between the event and the monitored exceedances and provides an analysis supporting the not reasonably controllable or preventable (nRCP) criteria. Furthermore, the report provides information that the exceedances would not have occurred without the entrainment of fugitive windblown dust from outlying deserts and mountains within the Sonoran Desert. The document further substantiates the request by the ICAPCD to exclude PM_{10} 24-hour NAAQS exceedance of

[1] According to the National Institute of Standards and Technology (NIST) Time and Frequency Division the designation of the time of day for specific time zones are qualified by using the term "standard time" or "daylight time". For year-round use, the designation can be left off inferring "local time" daylight or standard whichever is present. For 2014 Pacific Daylight Time (PDT) is March 9 through November 2. https://www.nist.gov/pml/time-and-frequency-division/local-time-faqs#intl

[2] Area Forecast Discussion National Weather Service San Diego CA 0230 AM PST (0330 AM PDT), Tuesday, May 20, 2014

250 µg/m^3 (**Table 1-1**) as an exceptional event. This demonstration substantiates that this event meets the definition of the USEPA Regulation for the Treatment of Data Influenced by Exceptional Events (EER)[3].

I.1 Demonstration Contents

Section II - Describes the May 20, 2014 event as it occurred in California and into Imperial County, providing background information of the exceptional event and explaining how the event affected air quality. Overall, this section provides the evidence that the event was a natural event.

Section III - Using time-series graphs, summaries and historical concentration comparisons of the Brawley station, this section discusses and establishes how the May 20, 2014 event affected air quality demonstrating that a clear causal relationship exists between the event and the monitored exceedance. It is perhaps of some value to mention that the time-series graphs include PM_{10} data measured in both local conditions and standard conditions. Measured PM_{10} continuous data prior to 2013 is in local conditions, all other data is in standard conditions. The concentration difference between local and standard conditions has an insignificant impact on any data analysis. Overall, this section provides the evidence that human activity played little or no direct causal role in the May 20, 2014 event and its resulting emissions defining the event as a "natural event".[4]

Section IV - Provides evidence that the event of May 20, 2014 was not reasonably controllable or preventable despite the full enforcement and implementation of Best Available Control Measures (BACM).

Section V - Brings together the evidence presented within this report to show that the exceptional event affected air quality; that the event was not reasonably controllable or preventable; that there was a clear causal relationship between the event and the exceedance, and that the event was a natural event.

I.2 Requirements of the Exceptional Event Rule

The above sections combined comprise the technical requirements described under the Exceptional Events Rule (EER) under 40 CFR §50.14(c)(3)(iv). However, in order for the USEPA to concur with flagged air quality monitoring data, there are additional non-technical requirements.

[3] "Treatment of Data Influenced by Exceptional Events; Final Guidance", 81 FR 68216, October 2, 2016

[4] Title 40 Code of Federal Regulations part 50: §50.1(k) Natural event means an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. For purposes of the definition of a natural event, anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions.

I.2.a Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

The National Weather Service (NWS) notifications via the ICAPCD's webpage indicated that a closed low-pressure system has been moving southward along the west coast centering near the Bay area. Because of stronger onshore flow, gusty west winds in the mountains and deserts increased during the afternoon and evening hours. As early, as May 18, 2014 the San Diego NWS issued Urgent Weather Messages advising of west winds 20 to 30 mph with gusts up to 50 mph. The identified areas included near mountain ridge tops and desert mountain slopes into adjacent desert areas. Because of the potential for suspended particles and poor air quality, the ICAPCD issued a "No Burn" day in Imperial County on May 20, 2014. **Appendix A** contains copies of notices pertinent to the May 20, 2014 event.

I.2.b Initial Notification of Potential Exceptional Event (INPEE) (40 CFR §50.14(c)(2))

States are required under federal regulation to submit measured ambient air quality data into the AQS. AQS is the federal repository of Quality Assured and Quality Controlled (QA/QC) ambient air data used for regulatory purposes. When States intend to request the exclusion of one or more exceedances of a NAAQS as an exceptional event a notification to the Administrator is required. Notification occurs when an agency submits a request, which includes an initial event description, for flagging data in AQS.

On October 3, 2016, the US EPA promulgated revisions to the Exceptional Events rule, which included the requirement of an "Initial Notification of Potential Exceptional Event" (INPEE) process. This revised INPEE process requires communication between the US EPA regional office and the State, prior to the development of a demonstration. The intent of the INPEE process is twofold: to determine whether identified data may affect a regulatory decision and whether a State should develop/submit an EE Demonstration.

The ICAPCD made a formal written request to the California Air Resources Board (CARB) to place preliminary flags on the SLAMS measured concentrations from the Brawley monitor. The request, dated May 28, 2015 requested an initial flag for the measurement from the BAM 1020 in Brawley of 250 $\mu g/m^3$. Subsequently, after submittal of the request, CARB received corrected FEM data measurements in standard conditions, originally submitted in local conditions. USEPA requires data in standard conditions when making regulatory decisions. **Table 1-1** above provides the PM_{10} measured concentrations for all monitors in Imperial County for May 20, 2014. The difference in concentrations between local and standard has an insignificant impact on any data analysis. The submitted request included a brief description of the meteorological conditions for May 20, 2014 indicating that a potential natural event occurred.

I.2.c Documentation that the public comment process was followed for the event demonstration that was flagged for exclusion (40 CFR §50.14(c)(3)(v))

The ICAPCD posted, for a 30-day public review, a draft version of this demonstration on the ICAPCD webpage and published a notice of availability in the Imperial Valley Press on January 31, 2018. The published notice invited comments by the public regarding the request, by the ICAPCD, to exclude the measured concentrations of 250 µg/m^3 (**Table 1-1**) which occurred on May 20, 2014 in Brawley. The final closing date for comments was March 2, 2018. **Appendix A** contains a copy of the public notice affidavit along with any comments received by the ICAPCD for submittal as part of the demonstration (40 CFR §50.14(c)(3)(v)).

I.2.d Documentation submittal supporting an Exceptional Event Flag (40 CFR §50.14(c)(3)(i))

States that have flagged data as a result of an exceptional event and who have requested an exclusion of said flagged data are required to submit a demonstration that justifies the data exclusion to the USEPA in accordance with the due date established by USEPA during the INPEE process (40 CFR §50.14(c)(2)). Currently, bi-weekly meetings between USEPA, CARB and Imperial County continue to discuss any potential documentation of events.

The ICAPCD, after the close of the comment period and after consideration of the comments will submit this demonstration along with all required elements, including received comments and responses to USEPA Region 9 in San Francisco, California. The submittal of the May 20, 2014 demonstration will have a regulatory impact upon the development and ultimate submittal of the PM_{10} State Implementation Plan for Imperial County in 2018.

I.2.e Necessary demonstration to justify an exclusion of data under (40 CFR§50.14(c)(3)(iv))

A This demonstration provides evidence that the event, as it occurred on May 20, 2014, satisfies the definition in 40 CFR §50.1(j) and (k) for an exceptional event.

a The event created the meteorological conditions that entrained emissions and caused the exceedance.
b The event clearly "affects air quality" such that there is the existence of a clear causal relationship between the event and the exceedance.
c Analysis demonstrates that the event-influenced concentrations compared to concentrations at the same monitor at other times supports the clear causal relationship.
d The event "is not reasonably controllable and not reasonably preventable."
e The event is "caused by human activity that is unlikely to recur at a particular location or [is] a natural event."
f The event is a "natural event" where human activity played little or no direct causal role.

B This demonstration provides evidence that the exceptional event affected air quality in Imperial County by demonstrating a clear causal relationship between the event and the measured concentrations in Brawley.

C This demonstration provides evidence of the measured concentrations to concentrations at the same monitor at other times supporting the clear causal relationship between the event and the affected monitor.

II May 20, 2014 Conceptual Model

This section provides a summary description of the meteorological and air quality conditions under which the May 20, 2014 event unfolded in Imperial County. The subsection elements include

- » A description and map of the geographic setting of the air quality and meteorological monitors
- » A description of Imperial County's climate
- » An overall description of meteorological and air quality conditions on the event day.

II.1 Geographic Setting and Monitor Locations

According to the United States Census Bureau, Imperial County has a total area of 4,482 square miles of which 4,177 square miles is land and 305 square miles is water. Much of Imperial County is below sea level and is part of the Colorado Desert an extension of the larger Sonoran Desert (**Figure 2-1)**. The Colorado Desert not only in includes Imperial County but a portion of San Diego County.

FIGURE 2-1
COLORADO DESERT AREA IMPERIAL COUNTY

Fig 2-1: 1997 California Environmental Resources Evaluation System. According to the United States Geological Survey (USGS) Western Ecological Research Center, the Colorado Desert bioregion is part of the bigger Sonoran Desert Bioregion, which includes the Colorado Desert and Upper Sonoran Desert sections of California and Arizona, and a portion of the Chihuahuan Basin and Range Section in Arizona and New Mexico (Forest Service 1994)

A notable feature in Imperial County is the Salton Sea, which is at approximately 235 feet below sea level. The Chocolate Mountains are located east of the Salton Sea and extend in a northwest-southeast direction for approximately 60 miles (**Figure 2-2)**. In this region, the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect the northern-most extensions of the East Pacific rise. Consequently, the region is subject to earthquakes and the crust is being stretched, resulting in a sinking of the terrain over time.

FIGURE 2-2
SURROUNDING AREAS OF THE SALTON SEA

Fig 2-2: Image courtesy of the Image Science and Analysis Laboratory NASA Johnson Space Center, Houston Texas

All of the seven incorporated cities, including the unincorporated township of Niland, are surrounded by agricultural fields to the north, east, west and south (**Figure 2-6)**. Together, the incorporated cities, including Niland and the agricultural fields make what is known as the Imperial Valley. Surrounding the Imperial Valley are desert areas found on the eastern and western portions of Imperial County.

The desert area, found within the western portion of Imperial County is of note because of its border with San Diego County. From west to east, San Diego County stretches from the Pacific Ocean to its boundary with Imperial County. San Diego County has a varied topography. On its western side is 70 miles (110 km) of coastline. Most of San Diego between the coast and the Laguna Mountains consists of hills, mesas, and small canyons. Snow-capped (in winter)

mountains rise to the northeast, with the Sonoran Desert to the far east. Cleveland National Forest is spread across the central portion of the county, while the Anza-Borrego Desert State Park occupies most of the northeast. The southeastern portion of San Diego County is comprised of distinctive Peninsular mountain ranges. The mountains and deserts of San Diego comprise the eastern two-thirds of San Diego County and are primarily undeveloped back county with a native plant community known as chaparral. Of the nine major mountain ranges within San Diego County, the In-Ko-Pah Mountains and the Jacumba Mountains border Mexico and Imperial County.

Both mountain ranges provide the distinctive weathered dramatic piles of residual boulders that are visible while driving Interstate 8 from Imperial County through Devil's Canyon and In-Ko-Pah Gorge. Interstate 8 runs along the US border with Mexico from San Diego's Mission Bay to just southeast of Casa Grande Arizona.

FIGURE 2-3
JACUMBA PEAK

Fig 2-3: The Jacumba Mountains reach an elevation of 4,512 feet (1,375 m) at Jacumba Peak, near the southern end of the chain. Source: Wikipedia at https://en.wikipedia.org/wiki/Jacumba_Mountains

Northwest and northeast of the Jacumba Mountains is the Tierra Blanca Mountains, the Sawtooth Mountains and Anza-Borrego Desert State Park. Within the mountain ranges and the Anza-Borrego Desert State Park, there exists the Vallecito Mountains, the Carrizo Badlands, the Carrizo Impact Area, Coyote Mountains and the Volcanic Hills to name of few. Characteristically, these areas all have erosion that has occurred over time that extends from the Santa Rosa Mountains into northern Baja California in Mexico. For example, the Coyote Mountains consists of sand dunes left over from the ancient inland Sea of Cortez. Much of the terrain is still loose dirt, interspersed with sandstone and occasional quartz veins. The nearest community to the Coyote Mountain range is the community of Ocotillo. Of interest are the fossilized and hollowed out sand dunes that produce wind caves.

FIGURE 2-4
ANZA-BORREGO DESERT STATE PARK
CARRIZO BADLANDS

Fig 2-4: View southwest across the Carrizo Badlands from the Wind Caves in Anza-Borrego Desert State Park. Source: Wikipedia at https://en.wikipedia.org/wiki/Carrizo_Badlands

The Carrizo Badlands, which includes the Carrizo Impact Area used by the US Navy as an air-to-ground bombing range during World War II and the Korean War, lies within the Anza-Borrego Desert State Park. The Anza-Borrego Desert State Park is located within the Colorado Desert, is the largest state park in California occupying eastern San Diego County, reaching into Imperial and Riverside counties. The two communities within Anza-Borrego Desert State Park are Borrego Springs and Shelter Valley.

The Anza-Borrego Desert State Park lies in a unique geologic setting along the western margin of the Salton Trough. The area extends north from the Gulf of California to San Gorgonio Pass and from the eastern rim of the Peninsular Ranges eastward to the San Andreas Fault zone along the far side of the Coachella Valley. The Anza-Borrego region changed gradually over time from intermittently being fed by the Colorado River Delta to dry lakes and erosion from the surrounding mountain ranges. The area located within the southeastern and northeastern section of San Diego County is a source of entrained fugitive dust emissions that affect Imperial County when westerly winds funnel through the unique landforms causing in some cases wind tunnels that cause increases in wind speeds.

Historical observations have indicated that the desert slopes and mountains of San Diego are a source of fugitive emissions along with those deserts located to the east and west of Imperial County, which extend into Mexico (Sonoran Desert, **Figure 2-7**). Combined, the desert areas and mountains of San Diego and the desert areas that extend into Mexico are sources of dust emissions, which affect the Imperial County during high wind events.

FIGURE 2-5
ANZA-BORREGO DESERT STATE PARK
DESERT VIEW FROM FONT'S POINT

Fig 2-5: Desert view from Font's Point. Source: Font's Point Anza-Borrego Photographed by and copyright of (c) David Corby; Wikipedia at https://en.wikipedia.org/wiki/Anza-Borrego_Desert_State_Park

FIGURE 2-6
LOCATION AND TOPOGRAPHY OF IMPERIAL COUNTY

Fig 2-6: Depicts the seven incorporated cities within Imperial Valley - City of Calipatria, City of Westmorland, City of Brawley, City of Imperial, City of El Centro, City of Holtville, and the City of Calexico. Niland is unincorporated. Mexicali, Mexico is to the south

FIGURE 2-7
DESERTS IN CALIFORNIA, YUMA AND MEXICO

Fig 2-7: Depicts the Sonoran Desert as it extends from Mexico into Imperial County. Source: Google Earth Terra Matrics

The air quality and meteorological monitoring stations used in this demonstration are shown in **Figure 2-8**. Of the five SLAMS within Imperial County, four stations measure both meteorological and air quality data. These SLAMS are located in Calexico, El Centro, Westmorland, and Niland; the station located in Brawley only measures air quality. Other air monitoring stations measuring air quality and meteorological data used for this demonstration include stations in eastern Riverside County, southeastern San Diego County and southwestern Arizona (Yuma County) (**Figure 2-8 and Table 2-1)**.

As mentioned above, the PM_{10} exceedances on May 20, 2014, occurred at the Brawley station. The Brawley, Niland and Westmorland stations are regarded as the "northern" monitoring sites within the Imperial County air monitoring network. In order to properly analyze the contributions from meteorological conditions occurring on May 20, 2014, other meteorological sites were used in this demonstration which include airports in eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), Imperial County, and other sites relevant to the wind event, such as within northern Mexico. (**Figure 2-8 and Appendix B)**.

FIGURE 2-8
MONITORING SITES IN AND AROUND IMPERIAL COUNTY

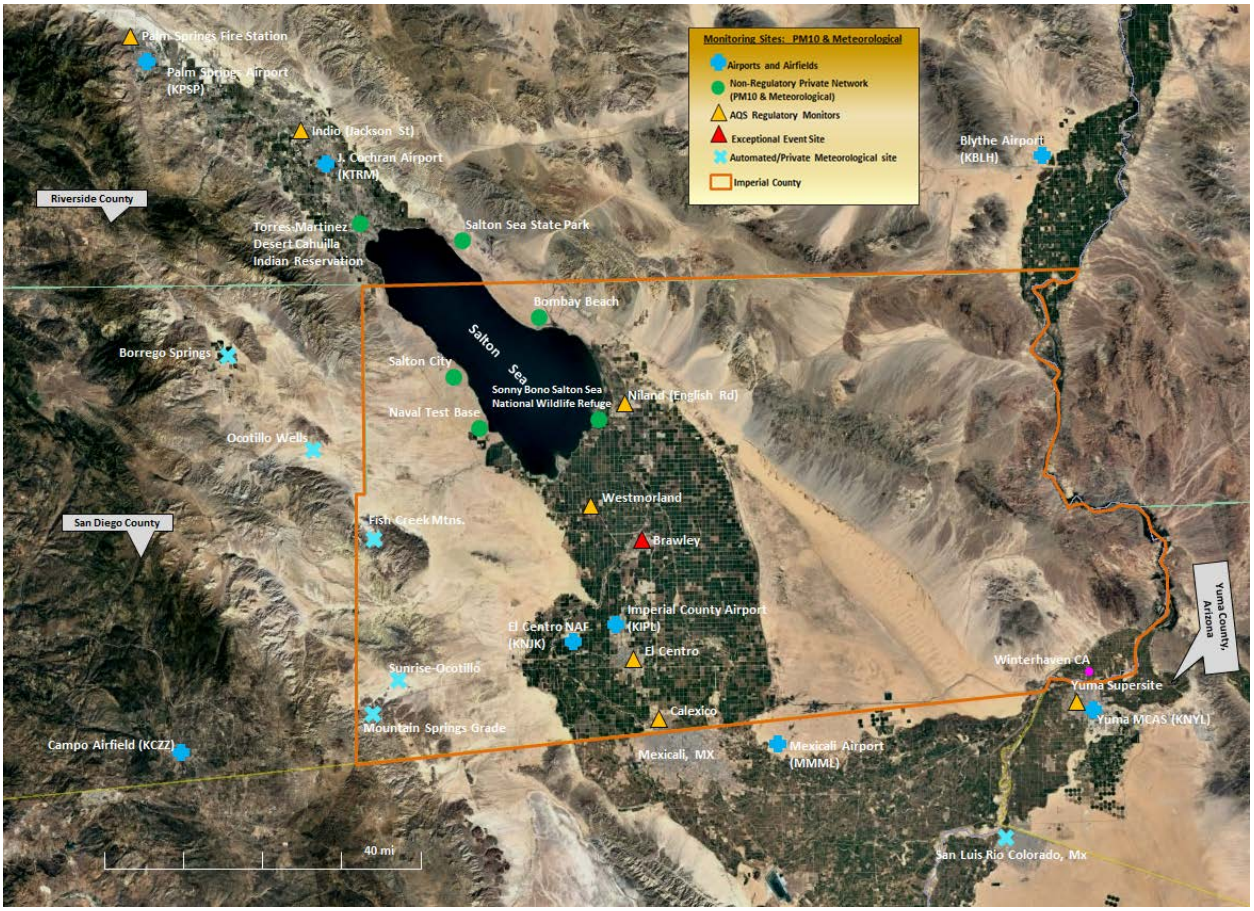


Fig 2-8: Depicts a select group of meteorological and PM_{10} monitoring sites in Imperial County, eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), and northern Mexico. The image provides the location of potential sites used to gather data in support of an Exceptional Event Demonstration. Source: Google Earth

In addition to meteorological sites, there are non-regulatory PM_{10} sites located around the Salton Sea that maybe referenced as an aid to help the reader understand the direction and velocity of winds that affect Imperial County. Unless, otherwise specifically indicated concentration references do not imply emissions from the surrounding playa of the Salton Sea. Three sites, in specific, are the Salton City air monitoring station, the Naval Test Base air monitoring station and the Sonny Bono air monitoring station. These privately owned stations are non-regulatory (**Figures 2-9 to 2-12**). The Salton City station is located 33.27275°N latitude and 115.90062˚W longitude, on the western edge of the Salton Sea (**Figure 2-9**). The station abuts a water reservoir along the Salton Sea with surrounding chaparral vegetation and unpaved open areas and roads. The Naval Test Base station is located 33.16923°N latitude and 115.85593˚W longitude, on the southwestern edge of the Salton Sea (**Figure 2-11**). The station sits on an abandoned US Military site, still owned by the Department of Defense. Unlike the Salton City station, light chaparral

vegetation and sandy open dune areas surround the Naval Test Base station. Directly to the west of the station is an orchard. The Sonny Bono station is located 33.17638°N latitude and 115.62310˚W longitude, on the southern portion of the Salton Sea within the Sonny Bono Salton Sea Wildlife Refuge. The Sonny Bono Salton Sea National Wildlife Refuge is 40 miles north of the Mexican border at the southern end of the Salton Sea within the Sonoran Desert. The Refuge has two separate managed units, 18 miles apart. Each unit contains wetland habitats, farm fields, and tree rows. The land of the Salton Sea Refuge is flat, except for Rock Hill, a small, inactive volcano, located near Refuge Headquarters. Bordering the Refuge is the Salton Sea on the north and farmlands on the east, south, and west.

FIGURE 2-9
SALTON CITY AIR MONITORING STATION

Fig 2-9: Depicts the Salton City air monitoring (circled) site operated by a private entity. View site photos at the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-10
SALTON CITY AIR MONITORING STATION
WEST

Fig 2-10: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe. https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-11
NAVAL TEST BASE AIR MONITORING STATION

Fig 2-11: Depicts the Naval Test Base air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13603&date=17

FIGURE 2-12
NAVAL TEST BASE AIR MONITORING STATION WEST

Fig 2-12: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe. https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-13
SONNY BONO AIR MONITORING STATION

Fig 2-13: Depicts the Sonny Bono air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-14
SONNY BONO SALTON SEA NATIONAL WILDLIFE REFUGE

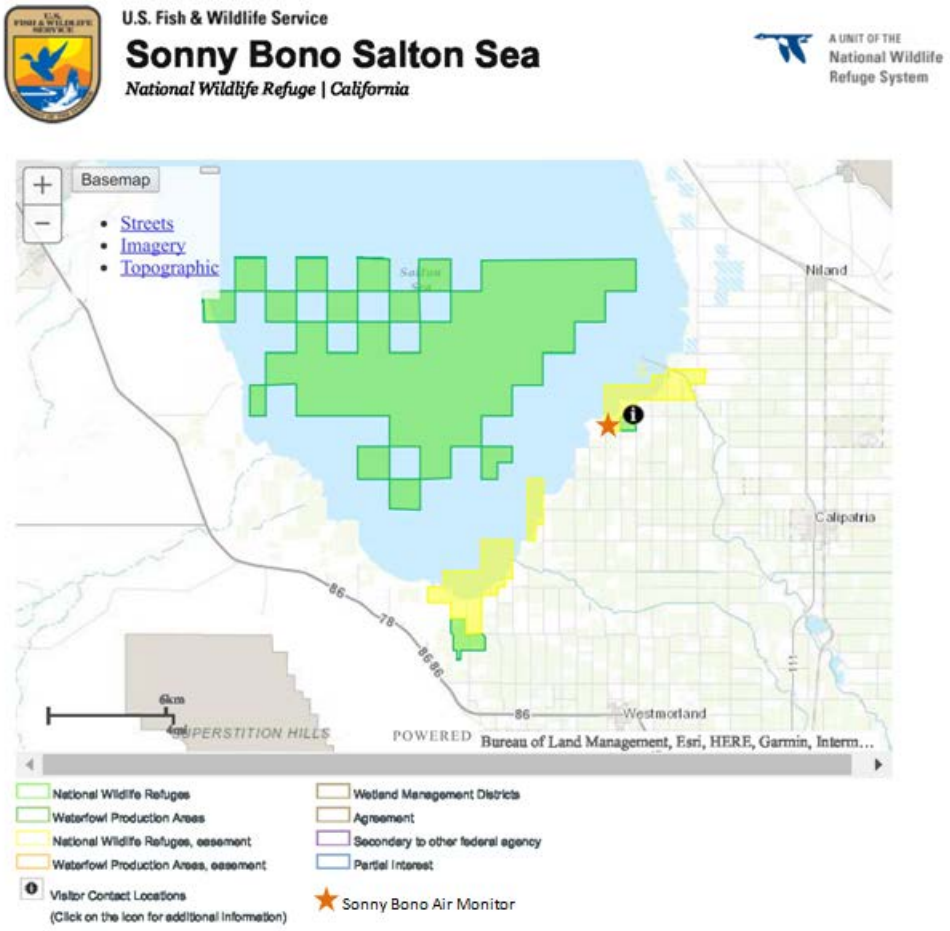


Fig 2-14: The Sonny Bono Wildlife Refuge has about 2,000 acres that are farmed and managed for wetlands. In 1998, the Refuge renamed after Congressman Sonny Bono, helped inform the U.S. Congress of the environmental issues facing the Salton Sea as well as acquiring funding for this Refuge to help it respond to avian disease outbreaks and other habitat challenges at the Salton Sea. Source: https://www.fws.gov/refuge/Sonny_Bono_Salton_Sea/about.html

TABLE 2-1
MONITORING SITES IN IMPERIAL COUNTY, RIVERSIDE COUNTY AND ARIZONA
MAY 20, 2014

Monitor Site Name	*Operator	Monitor Type	AQS ID	AQS PARAMETER CODE	ARB Site Number	Elevation (meters)	24-hr PM_{10} (ug/m^3) Avg***	1-hr PM_{10} (ug/m^3) Max	**Time of Max Reading	Max Wind Speed (mph)	**Time of Max Wind Speed
IMPERIAL COUNTY											
Brawley-Main Street #2	ICAPCD	Hi-Vol Gravimetric	06-025-0007	(81102)	13701	-15	-	-	-	-	-
		BAM 1020					251.4	934.2	21:00		
Calexico-Ethel Street	CARB	Hi-Vol Gravimetric	06-025-0005	(81102)	13698	3	-	-	-	19.4	19:00
El Centro-9th Street	ICAPCD	Hi-Vol Gravimetric	06-025-1003	(81102)	13694	9	-	-	-	15.5	12:00
Niland-English Road	ICAPCD	Hi-Vol Gravimetric	06-025-4004	(81102)	13997	-57	-	-	-	26.9	17:00
		BAM 1020					122.4	261	1:00		
Westmorland	ICAPCD	Hi-Vol Gravimetric	06-025-4003	(81102)	13697	-43	-	-	-	-	-
RIVERSIDE COUNTY											
Palm Springs Fire Station	SCAQMD	TEOM	06-065-5001	(81102)	33137	174	22.9	40	18:00	-	-
Indio (Jackson St.)	SCAQMD	TEOM	06-065-2002	(81102)	33157	1	46.2	126	21:00	-	-
ARIZONA – YUMA											
Yuma Supersite	ADEQ	TEOM	04-027-8011	(81102)	N/A	60	114.6	287	21:00	-	-

*CARB = California Air Resources Board
*ICAPCD = Air Pollution Control District, Imperial County
*SCAQMD = South Coast Air Management Quality District
*ADEQ =Arizona Department of Environmental Quality

**Time represents the actual time/hour of the measurement in question according to the zone time (PST unless otherwise noted)

II.2 Climate

As mentioned above, Imperial County is part of the Colorado Desert, which is a subdivision of the larger Sonoran Desert (**Figure 2-15**) encompassing approximately 7 million acres (28,000 km^2). The desert area encompasses Imperial County and includes parts of San Diego County, Riverside County, and a small part of San Bernardino County.

FIGURE 2-15
SONORAN DESERT REGION

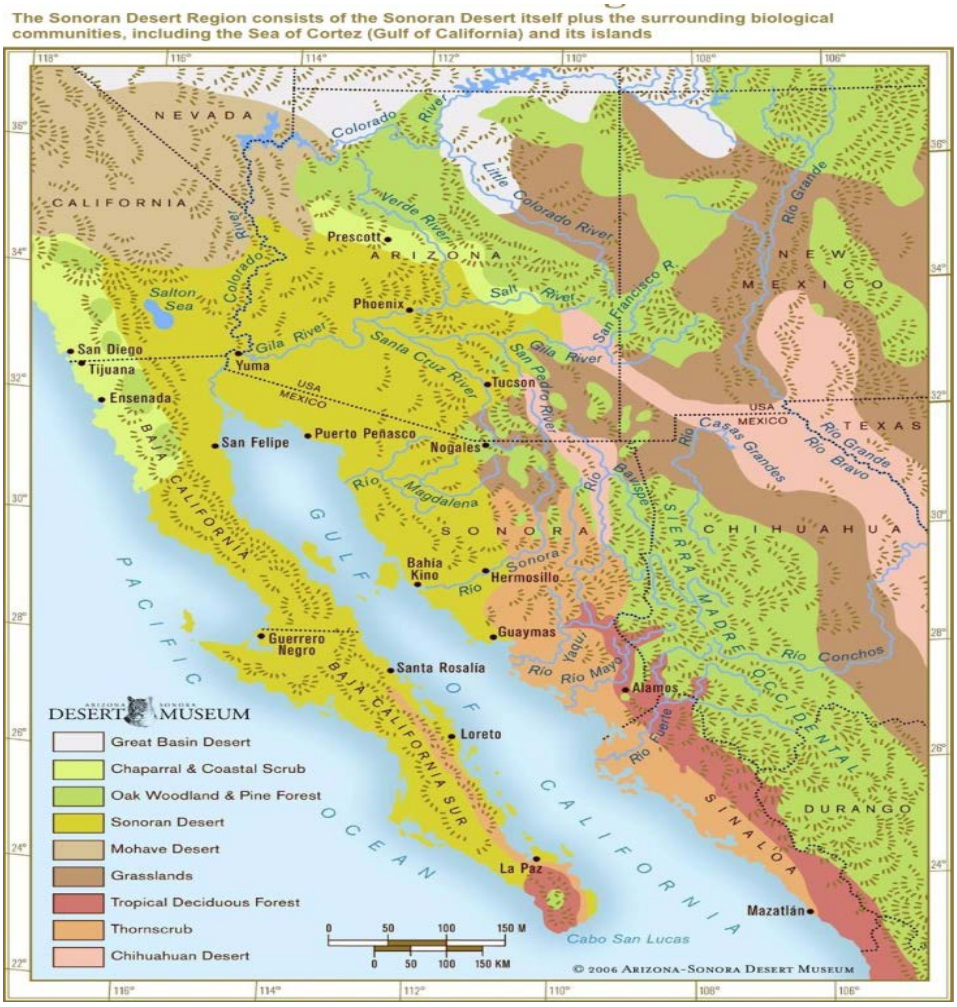


Fig 2-15: Depicts the magnitude of the region known as the Sonoran Desert. Source: Arizona-Sonora Desert Museum at http://desertmuseum.org/center/map.php

The majority of the Colorado Desert lies at a relatively low elevation, below 1,000 feet (300 m), with the lowest point of the desert floor at 275 feet (84 m) below sea level at the Salton Sea. Although the highest peaks of the Peninsular Range reach elevations of nearly 10,000 feet (3,000 m), most of the region's mountains do not exceed 3,000 feet (910 m).

In the Colorado Desert (Imperial County), the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect to the northern-most extensions of the East Pacific Rise. Consequently, the region is subject to earthquakes, and the crust is being stretched, resulting in a sinking of the terrain over time.

The Colorado Desert's climate distinguishes it from other deserts. The region experiences greater summer daytime temperatures than higher-elevation deserts and almost never experiences frost. In addition, the Colorado Desert experiences two rainy seasons per year (in the winter and late summer), especially toward the southern portion of the region which includes a portion of San Diego County. The Colorado Desert portion of San Diego County receives the least amount of precipitation. Borrego Springs, the largest population center within the San Diego desert region averages 5 inches of rain with a high evaporation rate. By contrast, the more northerly Mojave Desert usually has only winter rains.

The west coast Peninsular Ranges, or other west ranges, of Southern California–northern Baja California, block most eastern Pacific coastal air and rains, producing an arid climate. Other short or longer-term weather events can move in from the Gulf of California to the south, and are often active in the summer monsoons. These include remnants of Pacific hurricanes, storms from the southern tropical jet stream, and the northern Inter Tropical Convergence Zone (ITCZ).

The arid nature of the region is demonstrated when historic annual average precipitation levels in Imperial County average 3.11" (**Figure 2-16)**. During the 12-month period prior to May 20, 2014, Imperial County measured total annual precipitation of 2.12 inches. Such arid conditions, as those preceding the event, result in soils that are particularly susceptible to particulate suspension by the elevated gusty winds.

FIGURE 2-16
IMPERIAL COUNTY HISTORICAL WEATHER

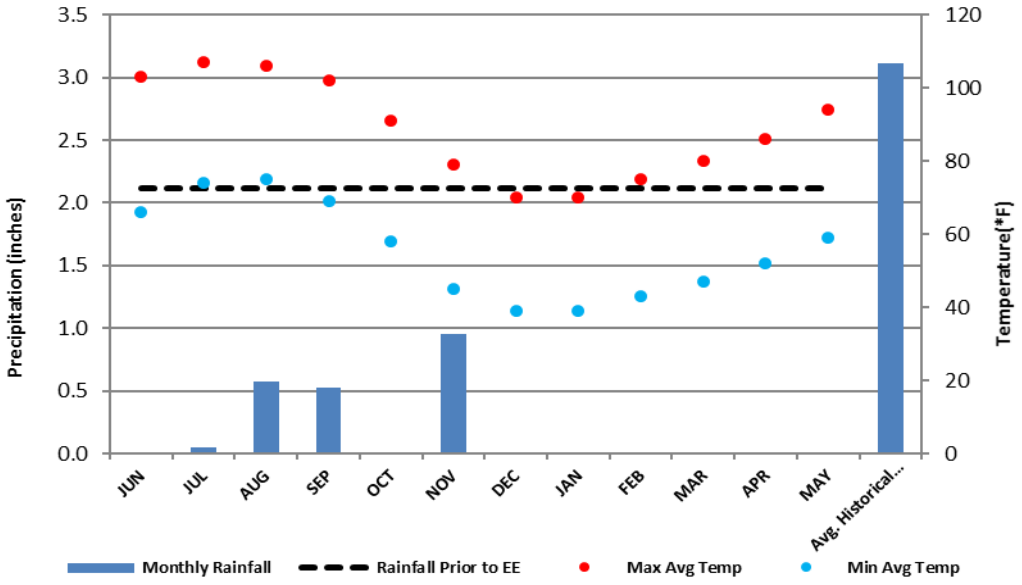


Fig 2-16: Prior to May 20, 2014, the region had suffered abnormally low total precipitation of 2.12 inches. Average annual precipitation is 3.11 inches. Meteorological data courtesy of Weather Underground, California Observed Climate Normals, and Western Regional Climate Center (WRCC)

The NWS explains that the speed of any wind resulting from a weather system is directly proportional to the change in air pressure, called a pressure gradient, such that when the pressure gradient increases so does the speed of the wind.[5] Because the pressure gradient is just the difference in pressure between high and low-pressure areas, changes in weather patterns may recur seasonally.

Typically, high pressure brings clear skies and with no clouds, there is more incoming shortwave solar radiation causing temperatures to rise. When surface winds become light, the cooling of the air produced directly under a high-pressure system can lead to a buildup of particulates in urban areas under an elongated region of relatively high atmospheric pressure or ridge causing widespread haze. Conversely, a trough is an elongated region of relatively low atmospheric pressure often associated with fronts. Troughs may be at the surface, or aloft under various conditions. Most troughs bring clouds, showers, and a wind shift, particularly following the passage of the trough.

While windblown dust events in Imperial County during the summer monsoon season are often due to outflow winds from thunderstorms, windblown dust events in the fall, winter, and spring are usually due to strong winds associated with low-pressure systems and cold fronts moving southeast across California. These winds are the result of strong surface pressure gradients between the approaching low-pressure system, accompanying cold front, and higher pressure ahead of it. As the low-pressure system and cold front approaches and passes, gusty southwesterly winds typically shift to northwesterly causing variable west winds. These strong winds suspend dust into the atmosphere and transport windblown dust over long distances, especially if soils in the region are dry.

II.3 Event Day Summary

The exceptional event for May 20, 2014, caused by an upper-level trough that created atmospheric mixing at the lower levels with associated strong, gusty westerly winds blew across the San Diego mountains and deserts slopes into Imperial County. According to the San Diego NWS office, the upper low moved toward southern California as early as the evening hours of Sunday, May 18, 2014.[6] Strong westerly winds aloft combined with onshore pressure gradients producing winds in the mountains and deserts. The discussion released by the San Diego NWS May 19, 2014 described a potent closed upper low over the northern California coast expected to dig southeast down the California interior by Tuesday, May 20, 2014.[7] By 150 pm on May 20, 2014, the upper level low shifted slowly inland across central California. This kept southern California under the southwesterly flow aloft with most of the mountains and desert locations gusting between 35 and 45 mph.[8] Although onshore gradients weakened a bit by 1800 PST areas

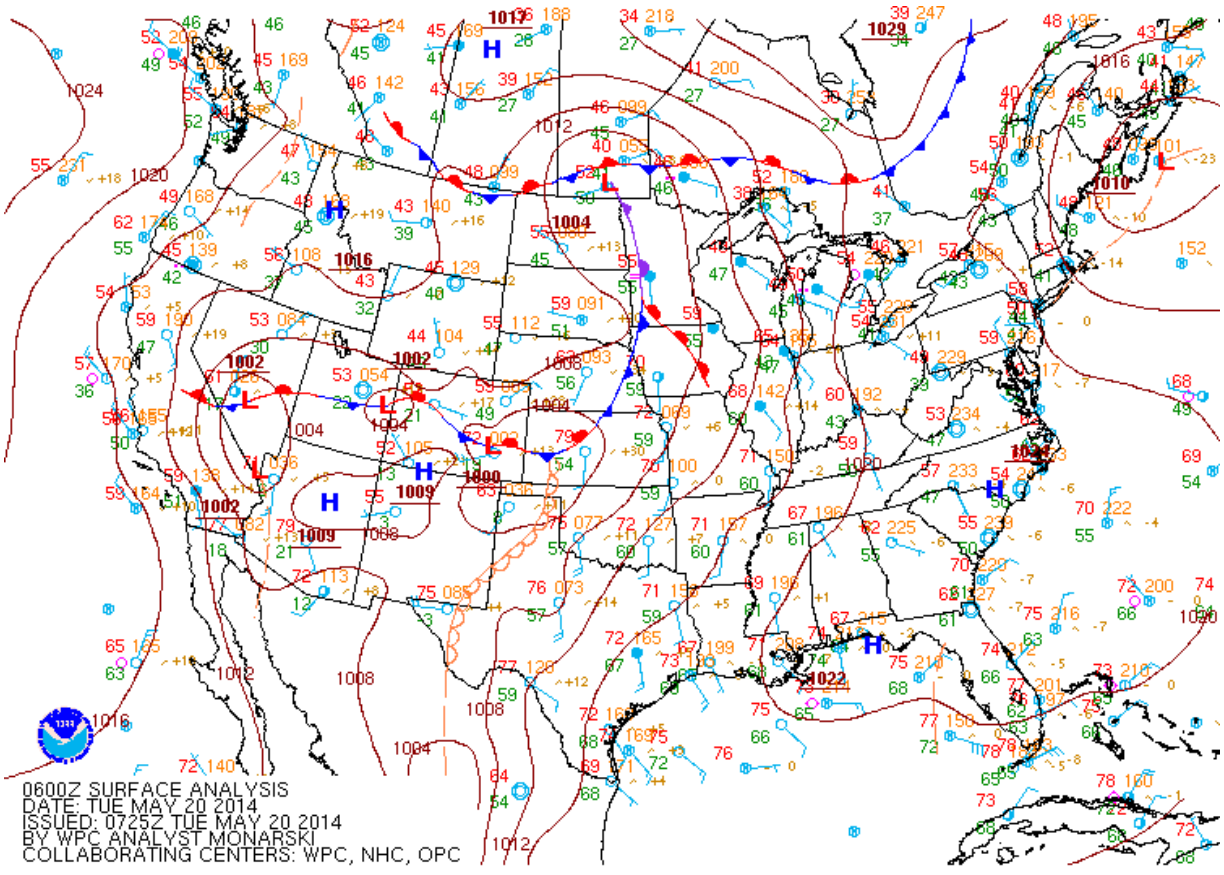
[5] NWS JetStream – Origin of Wind http://www.srh.noaa.gov/jetstream/synoptic/wind.html
[6] Area Forecast Discussion National Weather Service San Diego CA 830 PM PST (930 PM PDT), Sunday, May 18, 2014.
[7] Area Forecast Discussion National Weather Service San Diego CA 815 PM PST (915 PM PDT), Monday, May 19, 2014.
[8] Area Forecast Discussion National Weather Service San Diego CA 1250 PM PST (150 PM PDT), Tuesday, May 20, 2014.

of gusty westerly winds continued along and below the desert slopes of the San Diego mountains.[9]

Therefore, the NWS office in San Diego and Phoenix issued 13 notices in the form of Urgent Weather Messages, Preliminary Local Storm Reports, and Hazardous Weather Outlooks. These notices contained wind advisories, effective through Tuesday, May 20, 2014 identifying westerly winds 20 to 30 mph with gusts up to 45 mph near mountain ridge tops and desert mountain slopes with the strongest gusts along the northern Coachella Valley and along the desert slopes of the San Diego Mountains and Imperial County. **Appendix A** contains copies of notices pertinent to the May 20, 2014 event.

Figures 2-17 and 2-18 provide the conditions present on May 20, 2014, which illustrate the expected affect upon the southeastern part of California. These conditions combined created the exceptional event that transported windblown dust into Imperial County affecting the Brawley monitor.

FIGURE 2-17
SURFACE ANALYSIS MAP



[9] Area Forecast Discussion National Weather Service San Diego CA 726 PM PST (826 PM PDT), Tuesday, May 20, 2014.

Fig 2-17: A surface analysis map for May 19, 2014 at 2200 PST (May 20, 2014 0600Z) illustrates the low pressure positioned over southern Nevada. An upper level trough moving over southern California strengthened the low, resulting in a tightening of pressure gradients that in turn led to high winds across southeastern California and parts of southwestern Arizona. Source: Weather Prediction Center Surface Analysis Archive

FIGURE 2-18
GOES-W VISIBLE INFRARED SATELLITE IMAGES

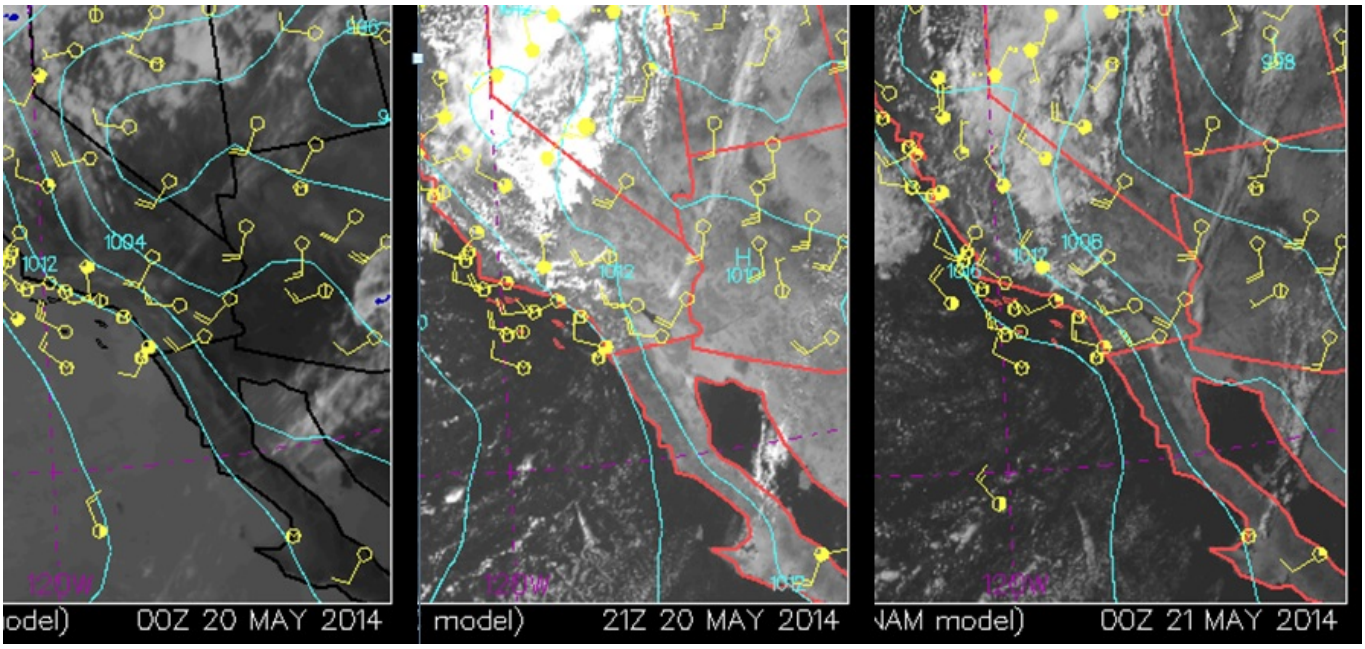


Fig 2-18: GOES-W Infrared (left) and Visible (middle and right) sea level pressure analysis maps at 1600 PST on May 19, 2014 (left); May 20, 2014 at 1300 PST (middle); May 20, 2014 at 1600 PST (right). All three have wind barbs depicting west-southwest to southwest winds of around 23 mph over southeastern California. These strong southwesterly winds affected the Brawley monitor on May 20, 2014. Images courtesy of SFSU Earth and Climate Sciences Department and the California Regional Weather Server

As explained above, the NWS office in San Diego and Phoenix issued 13 notices in the form of Urgent Weather Messages, Preliminary Local Storm Reports, and Hazardous Weather Outlooks when an upper low moved toward southern California as early as the evening hours of Sunday, May 18, 2014 with strong southwesterly winds aloft combining with onshore pressure gradients producing winds along the desert slopes of the San Diego Mountains and deserts.

These notices contained wind advisories, effective through Tuesday, May 20, 2014 identifying westerly winds 20 to 30 mph with gusts up to 45 mph near mountain ridge tops and desert mountain slopes with the strongest gusts along the northern Coachella Valley and along the desert slopes of the San Diego Mountains and Imperial County.

Locally, measured winds at regional airports included five hours of winds equal to or above the 25-mph threshold at KIPL along with 11 hours of gusts 32 mph or above. Similarly, the El Centro NAF (KNJK) had nine hours of winds equal or greater than 25 mph, with nine hours of gusts at or above 30 mph. On May 20, 2014 the Palm Springs International Airport (KPSP), Jacqueline Cochran-Thermal Regional Airport (KTRM), and the Blythe Airport (KBLH) in eastern Riverside County all measured gusts over 30 mph. The Yuma MCAS (KNYL) to the southeast of Brawley also measured gusts over 30 mph. **Figure 2-19** is a graphical illustration of the chain of events for May 20, 2014.

FIGURE 2-19
RAMP-UP ANALYSIS MAY 19, 2014 AND MAY 20, 2014

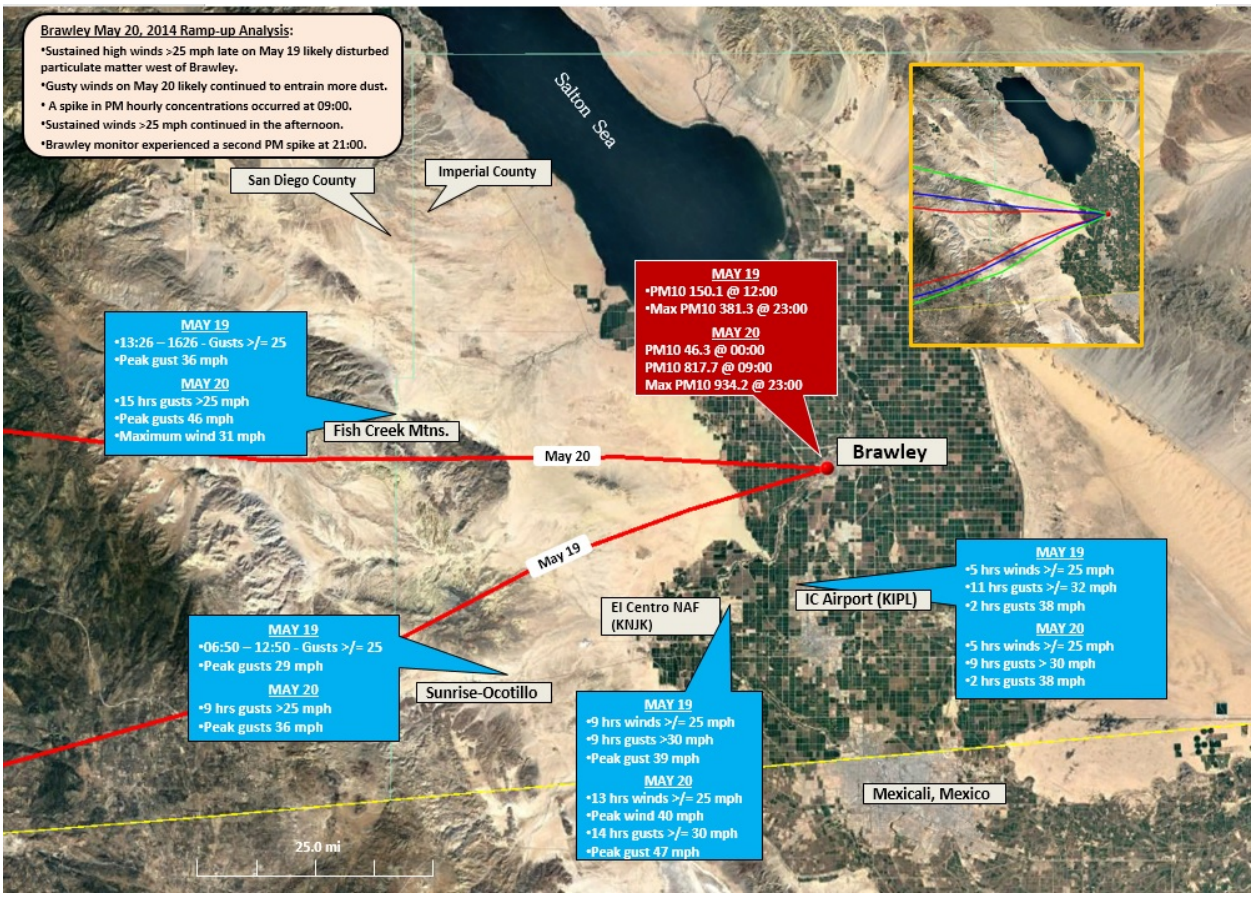


Fig 2-19: Gusty westerly winds at upstream sites on May 19, 2014 and on May 20, 2014 played a critical role in the exceedance measured by the Brawley monitor on May 20, 2014. Red lines depict airflow at the 10m level. A HYSPLIT 6-hour back-trajectory ending at 12:00 PST on May 19, 2014 illustrates airflow was from the WSW-SW. A 24-hour back-trajectory ending at 2100 PST on May 20, 2014 illustrates a shift in wind direction. The HYSPLIT inset shows that airflow at 100m and 500m (blue and green lines) shifted to the WNW. Air quality data is from the EPA's AQS data bank. Wind data from the NCEI's QCLCD data bank. Base map from Google Earth

Table 2-2 contains a summary of maximum winds, peak wind gusts, and wind direction at

monitors in Imperial County, eastern Riverside County, Yuma County, Arizona, and Mexicali. For detailed meteorological station, graphs see **Appendix B.**

TABLE 2-2
WIND SPEEDS ON MAY 20, 2014

Station Monitor Airport Meteorological Data	Maximum Wind Speed (WS) (mph)	Wind Direction during Max WS (degrees)	*Time of Max Wind Speed	24 hr Maximum Wind Gust (WG) (mph)	Time of Max WG	PM_{10} correlated to time of Max Wind Speed	
						Brly	Nlnd
IMPERIAL COUNTY							
Imperial Airport (KIPL)	28	260	11:53	38	14:53	125	166
Naval Air Facility (KNJK)	40	260	20:56	47	20:56	547	-
Calexico (Ethel St)	19.4	302	14:00	-	-	112	149
El Centro (9th Street)	15.5	280	12:00	-	-	475	119
Niland (English Rd)	26.9	255	17:00	-	-	75.8	-
RIVERSIDE COUNTY							
Blythe Airport (KBLH)	25.3	230	10:52	33.4	11:52	85.1	136
Palm Springs Airport (KPSP)	27.6	330	10:53	35.7	10:53	85.1	136
Jacqueline Cochran Regional Airport (KTRM) - Thermal	21.9	340	21:52	36.8	12:52	934	204
ARIZONA - YUMA							
Yuma MCAS (KNYL)	24.2	300	20:57	31.1	20:57	547	-
MEXICALI - MEXICO							
Mexicali Int. Airport (MXL)	27.6	280	21:43	-	-	934	204

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted

National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory HYSPLIT back trajectory models,[10] **Figures 2-20 through 2-22** are 24-hour back trajectories that illustrate the path of airflow ending at three hourly peak concentrations, 0900am PST, 1200pm PST and 0900pm PST on May 20, 2014.

All three back-trajectories illustrate the path of airflow from the west. During the early morning and evening hours, the path of airflow shifted slightly from the north but remained predominantly from the west. During the afternoon hours airflow remained predominantly from the west. Airports in Riverside and Imperial County measured elevated winds during the evening hours of May 19, 2014 through May 20, 2014. The Jacqueline Cochran (Desert Resorts) airport (KTRM) measured moderately strong winds 9 mph through 21 mph while the Imperial County airport (KIPL) measured stronger wind speeds 11 mph through 28 mph.

[10] The Hybrid Single Particle Lagrangian Integrated Trajectory Model (**HYSPLIT**) is a computer model that is a complete system for computing simple air parcel trajectories to complex dispersion and deposition simulations. It is currently used to compute air parcel trajectories and dispersion or deposition of atmospheric pollutants. One popular use of HYSPLIT is to establish whether high levels of air pollution at one location are caused by transport of air contaminants from another location. HYSPLIT's back trajectories, combined with satellite images (for example, from NASA's MODIS satellites), can provide insight into whether high air pollution levels are caused by local air pollution sources or whether an air pollution problem was blown in on the wind The initial development was a result of a joint effort between NOAA and Australia's Bureau of Meteorology. Source: NOAA/Air Resources Laboratory, 2011.

Analysis indicates that wind direction, along with wind speeds, provided the ideal conditions for windblown dust from natural open areas located within the San Diego Mountains west of Brawley and northwest of Niland blew over natural open desert areas and agricultural lands affecting both monitors. While only the Brawley monitor exceeded the NAAQS, the Niland monitor more than likely would have exceeded had four hours of measured concentrations not been invalidated. Of particular note, modeled winds differ from local conditions at times. Data used in the HYSPLIT model has a horizontal resolution of 12 km, integrated every three hours. Thus, the HYSPLIT model may differ from local observed surface wind speeds and directions.

FIGURE 2-20
NOAA HYSPLIT MODEL ENDING 900 AM PST MAY 20, 2014

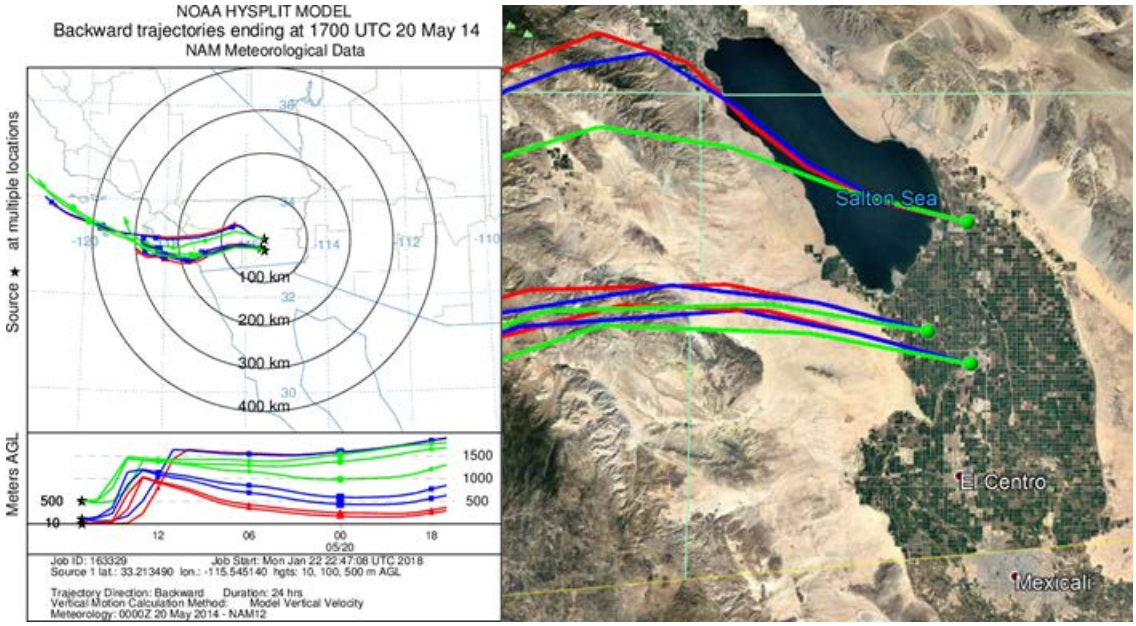


Fig 2-20: A 24-hour back-trajectory ending at 900 am PST on May 20, 2014, illustrates the path of airflow as it approached the Niland, Westmorland, and Brawley monitors. Red lines indicate airflow at 10 meters AGL (above ground level); blue=100 meters AGL; green=500 meters AGL. Generated through NOAA Air Resources Laboratory HYSPLIT

FIGURE 2-21
NOAA HYSPLIT MODEL ENDING 1200 PM PST MAY 20, 2014

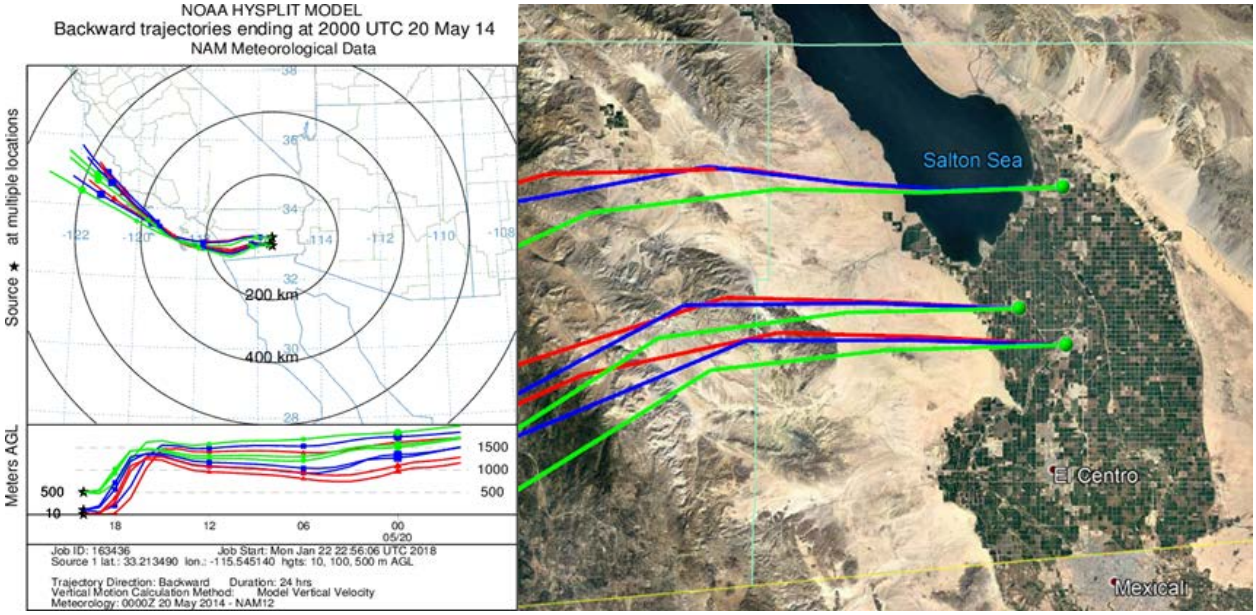


Fig 2-21: A 24-hour back-trajectory ending at 1200 pm PST on May 20, 2014, illustrates the path of airflow as it approached the Niland, Westmorland, and Brawley monitors. Red lines indicate airflow at 10 meters AGL (above ground level); blue=100 meters AGL; green=500 meters AGL. Generated through NOAA Air Resources Laboratory HYSPLIT

FIGURE 2-22
NOAA HYSPLIT MODEL ENDING 900 PM PST MAY 20, 2014

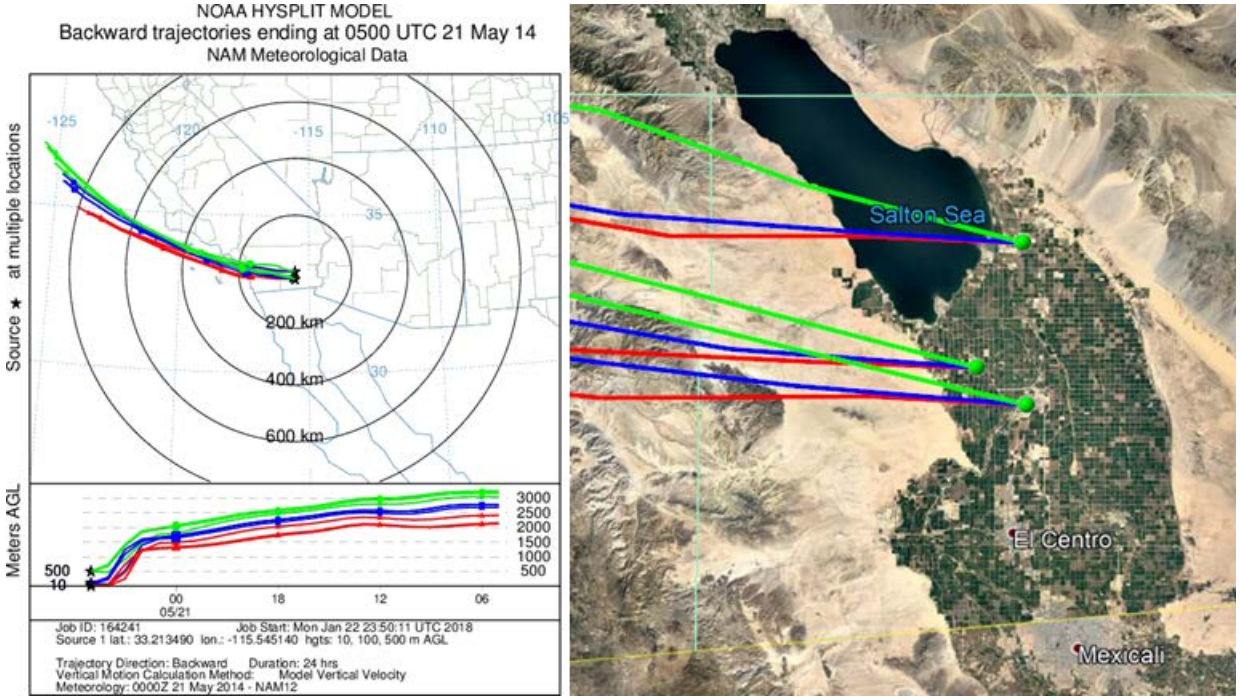


Fig 2-22: A 24-hour back-trajectory ending at 900 pm PST on May 20, 2014, illustrates the path of airflow as it approached the Niland, Westmorland, and Brawley monitors. Red lines indicate airflow at 10 meters AGL (above ground level); blue=100 meters AGL; green=500 meters AGL. Generated through NOAA Air Resources Laboratory HYSPLIT

Figure 2-23 illustrates the elevated levels of PM_{10} concentrations measured in Riverside, Imperial and Yuma counties for a total of three days, May 19, 2014 through May 21, 2014. Elevated emissions transported into Imperial County affected the Brawley and Niland monitors when gusty westerly winds, associated with the passage of an upper level low moved into southern California as early as the evening hours of May 18, 2014. The Brawley and Niland monitors measured the highest elevated concentrations between 0900 PST and 2300 PST coincident with measured elevated wind speeds and gusts.

The resulting entrained windblown dust and accompanying high winds from the system qualify this event as a "high wind dust event".[11] High wind dust events are considered natural events where the windblown dust is either from solely a natural source or from areas where anthropogenic sources of windblown dust are controlled with Best Available Control Measures (BACM). The following sections provide evidence that the May 20, 2014 high, wind event qualifies as a natural event and that BACM was overwhelmed by the suddenness and intensity of the meteorological event.

[11] Title 40 Code of Federal Regulations part 50: §50.1(p) High wind dust event is an event that includes the high-speed wind and the dust that the wind entrains and transports to a monitoring site.

FIGURE 2-23
72 HOUR PM_{10} CONCENTRATIONS AT REGIONAL STATIONS

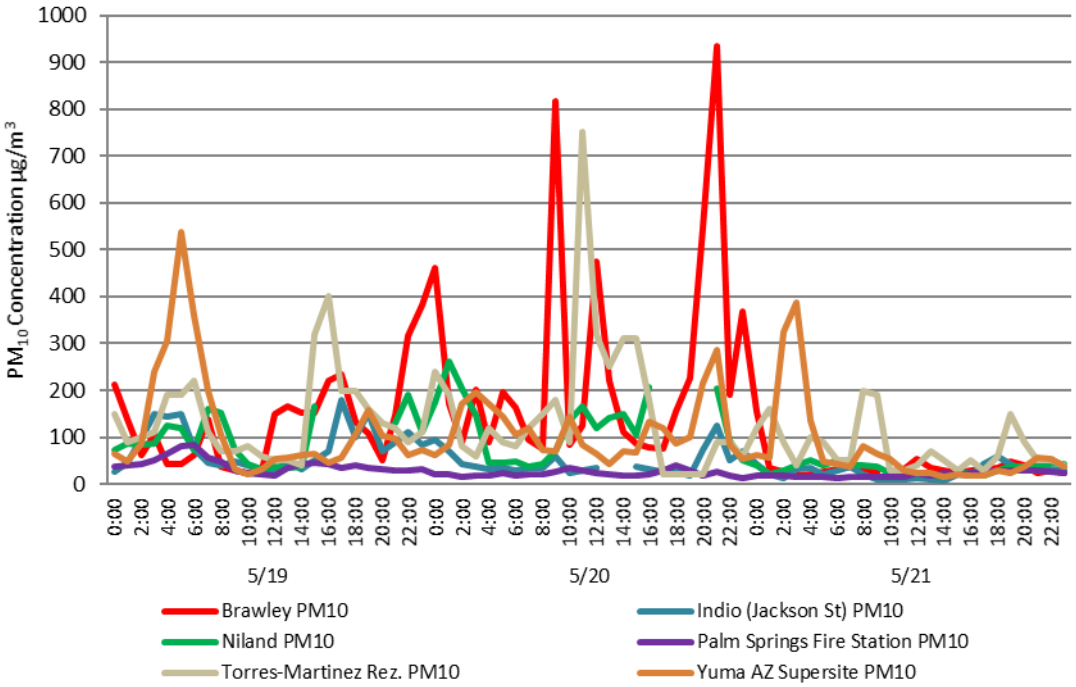


Fig 2-23: Is the graphical representation of the 72-hour relative PM_{10} concentrations at various monitoring locations throughout Riverside, Imperial and Yuma counties. The elevated PM10 concentrations provides supporting evidence of the regional effect of the gusty westerly winds. Air quality data from the EPA's AQS data bank

III Historical Concentrations

III.1 Analysis

While naturally occurring high wind events may recur seasonally and at times frequently and qualify for exclusion under the EER, historical comparisons of the particulate concentrations and associated winds provide insight into the frequency of events within an identified area. The following time series plots illustrate that PM_{10} concentrations measured at the Brawley monitor on May 20, 2014, compared to non-event and event days demonstrate the variability over several years and seasons. The analysis also provides supporting evidence that there exists a clear causal relationship between the May 20, 2014 high wind event and the exceedance measured at the Brawley monitor.

Figures 3-1 through 3-6 show the time series of available FRM and BAM 24-hr PM_{10} concentrations at the Brawley monitor for the period of January 1, 2010 through May 20, 2014. Note that prior to 2013, BAM data was not FEM therefore, not reported into AQS. Properly establishing the variability of the event as it occurred on May 20, 2014, 24-hour averaged PM_{10} concentrations between January 1, 2010 and May 20, 2014 were compiled and plotted as a time series. All figures illustrate that the exceedance, which occurred on May 20, 2014, were outside the normal historical concentrations when compared to event and non-event days. Air quality data for all graphs obtained through the EPA's AQS data bank.

FIGURE 3-1
BRAWLEY HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO MAY 20, 2014

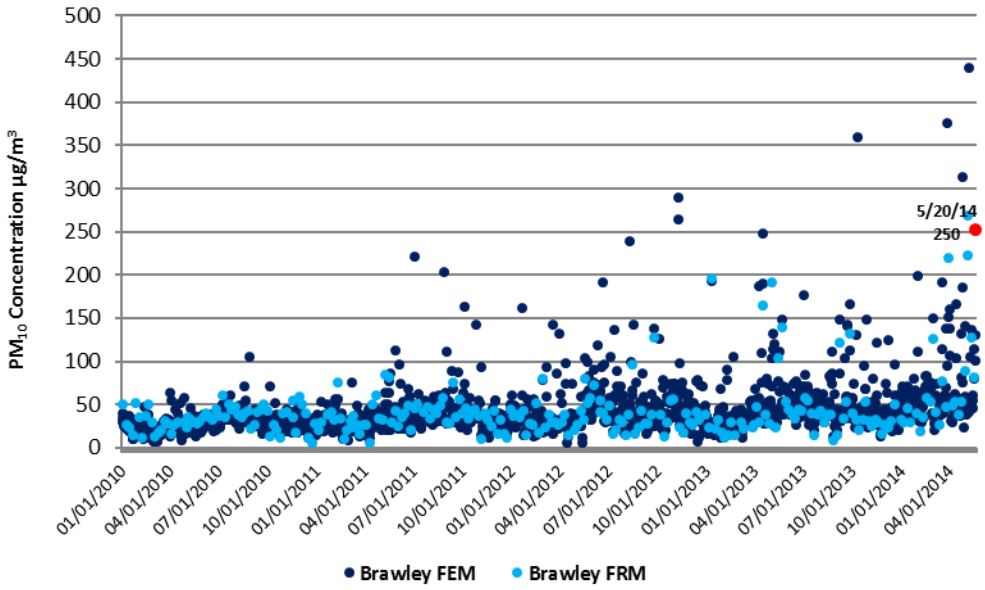


Fig 3-1: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 250 µg/m^3 by the Brawley monitor was outside the normal historical concentrations when compared to similar days and non-event days. Of the 1,602 sampling days, there were 28 exceedance days which equates to less than a 2.0% occurrence rate

The time series, **Figure 3-1**, for Brawley included 1,861 credible samples, measured between January 1, 2010 and May 20, 2014.

Overall, the time series illustrates that the Brawley monitor, measured 28 exceedance days out of the 1,602 sampling days, which is less than a 2.0% occurrence rate. Of the 28 measured exceedance days, 12 exceedance days occurred during the second quarter (April through June). The remaining 16 exceedances occurred during the first, third, and fourth quarters. No exceedances of the standard occurred during 2010. As mentioned above, FEM BAM data was not regulatory from 2010 to 2012.

FIGURE 3-2
BRAWLEY SEASONAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
APRIL 1, 2010 TO JUNE 30, 2014

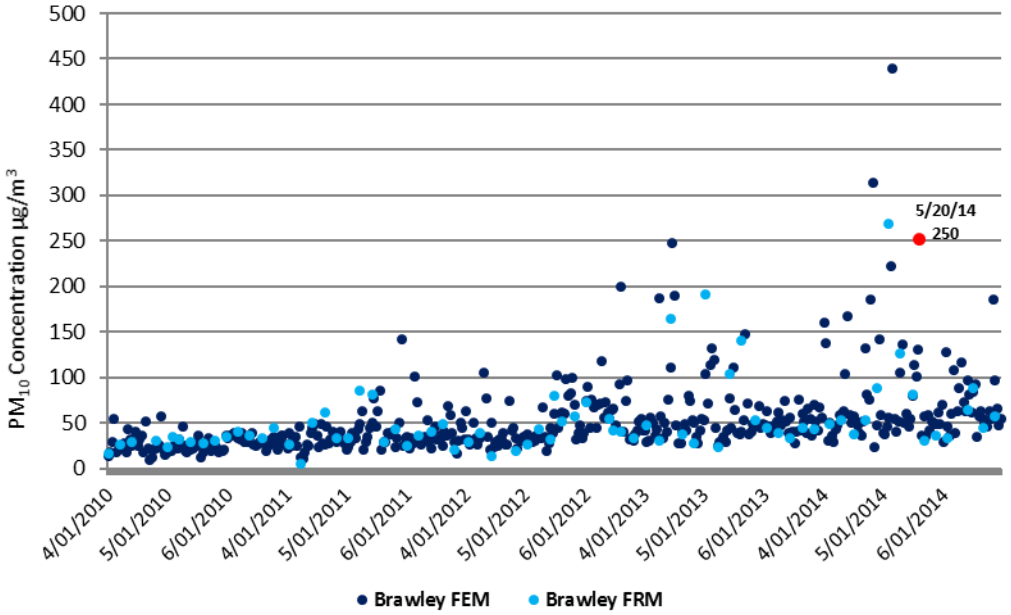


Fig 3-2: A comparison of PM_{10} seasonal concentrations demonstrates that the measured concentration of 250 µg/m^3 by the Brawley monitor was outside the normal seasonal concentrations when compared to similar days and non-event days. Of the 414 sampling days, there were 12 exceedance days which equates to less than a 3.0% occurrence rate

Figure 3-2, displays the seasonal fluctuation over 414 sampling days at the Brawley monitor second quarter (April to June) between 2010 and 2014. The Brawley monitor measured 482 credible samples over 414 sampling days. Of the 414 sampling days, there were 12 measured exceedance days, which equates to less than a 3.0% occurrence rate. The May 20, 2014 measured concentration at the Brawley monitor was outside the normal historical and seasonal concentrations when compared to both event days and non-event days.

FIGURE 3-3
BRAWLEY HISTORICAL
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO MAY 20, 2014

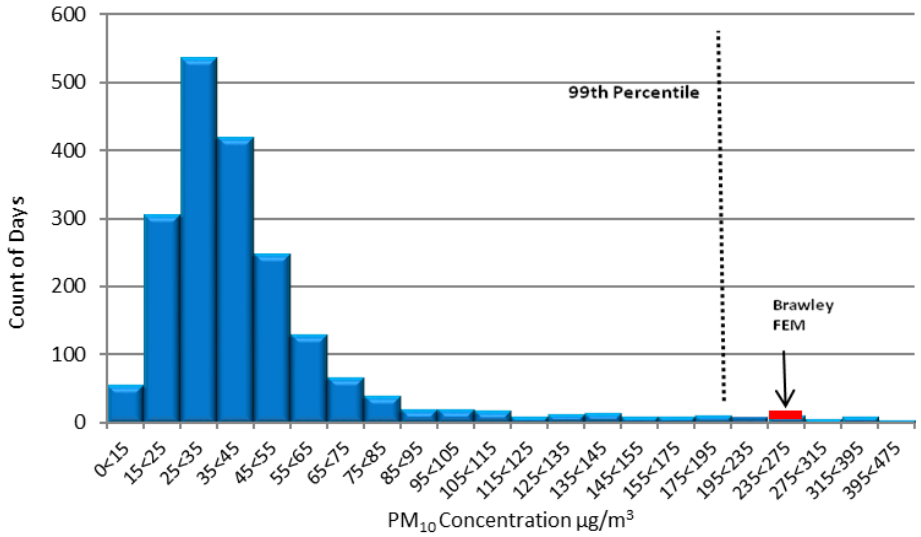


Fig 3-3: The 24-hr average PM_{10} concentration measured at the Brawley monitoring site demonstrates that the May 20, 2014 event was in excess of the 99th percentile

FIGURE 3-4
BRAWLEY SEASONAL
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
APRIL 1, 2010 TO JUNE 30, 2014

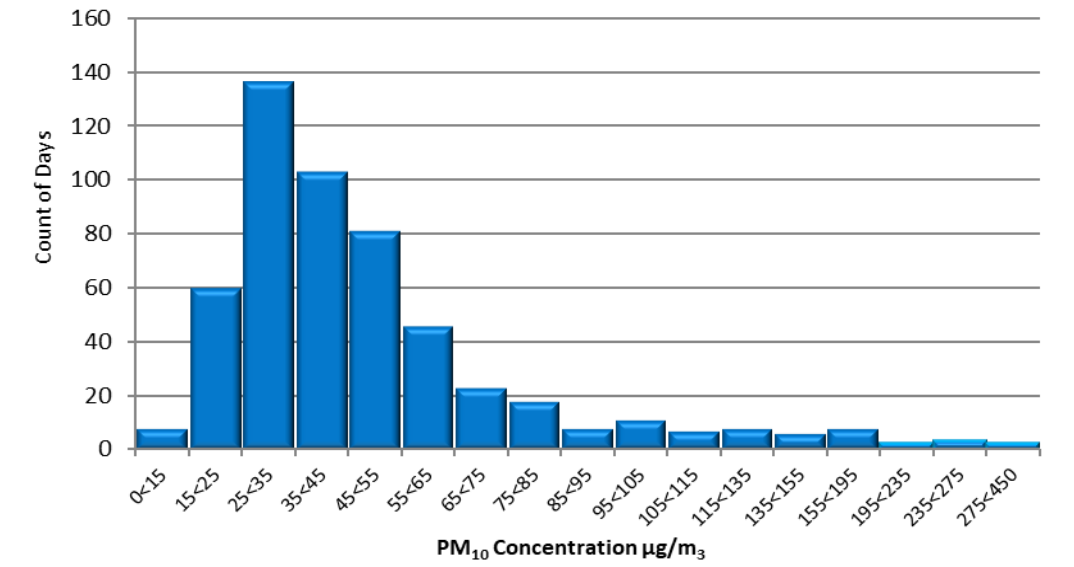


Fig 3-4: The 24-hr average PM_{10} concentration at the Brawley monitoring site demonstrates that the May 20, 2014 event was in excess of the 99th percentile

For the combined FRM and FEM datasets for the Brawley monitor the annual historical and the seasonal historical PM_{10} concentration of 250 µg/m^3 fell above the 99th percentile ranking. Looking at the annual time series concentrations, the seasonal time series concentrations, and the percentile rankings for both the historical and seasonal patterns the May 20, 2014 measured exceedance of 250 µg/m^3 is clearly outside the normal concentration levels when comparing to non-event days and event days.

III.2 Summary

The information provided, above, by the time series plots, seasonal time series plots, and the percentile rankings illustrate that the PM_{10} concentration observed on May 20, 2014 occurred infrequently. When comparing the measured PM_{10} levels on May 20, 2014 and following USEPA EER guidance, this demonstration provides supporting evidence that the measured exceedance measured at the Brawley monitor was outside the normal historical and seasonal historical concentration levels.

The historical concentration analysis provided here supports the determination that the May 20, 2014 natural event affected the concentration level at the Brawley monitor causing an exceedance. The concentration analysis further supports that the natural event affected air quality in such a way that there exists a clear causal relationship between the measured exceedance on May 20, 2014 and the natural event, qualifying the natural event as an Exceptional Event.

IV Not Reasonably Controllable or Preventable

According to the October 3, 2016 promulgated revision to the Exceptional Event (EE) rule under 40 CFR §50.14(b)(8) air agencies must address the "not reasonably controllable or preventable" (nRCP) criterion as two prongs. To address the nRCP criterion the ICAPCD must not only identify the natural and anthropogenic sources of emissions causing and contributing to the monitored exceedance but must identify the relevant State Implementation Plan (SIP) measures and/or other enforceable control measures in place for the identified sources. An effective analysis of the nRCP must include the implementation status of the control measures to consider the measures as enforceable. USEPA considers control measures enforceable if approved into the SIP within 5 years of an EE demonstration submittal. The identified control measures must address those specific sources that as causing or contributing to a monitored exceedance.

The final EE rule revision explains that an event is not reasonably controllable if reasonable measures to control the impact of the event on air quality were applied at the time of the event. Similarly, an event is not reasonably preventable if reasonable measures to prevent the event were applied at the time of the event. However, for "high wind events" when PM_{10} concentrations are due to dust raised by high winds from desert areas whose sources are controlled with Best Available Control Measures (BACM) then the event is a "natural event" where human activity plays little or no direct causal role and thus is considered not preventable.

This section begins by providing background information on all SIP and other enforceable control measures in force during the EE for May 20, 2014. In addition, this May 20, 2014 demonstration provides technical and non-technical evidence that strong gusty westerly winds blew across the mountains and deserts within southeastern California and into Imperial County suspending particulate matter affecting the Brawley monitor on May 20, 2014. This section identifies all natural and anthropogenic sources and provides regulatory evidence of the enforceability of the control measures in place during the May 20, 2014 EE.

IV.1 Background

Inhalable particulate matter (PM_{10}) contributes to effects that are harmful to human health and the environment, including premature mortality, aggravation of respiratory and cardiovascular disease, decreased lung function, visibility impairment, and damage to vegetation and ecosystems. Upon enactment of the 1990 Clean Air Act (CAA) amendments, Imperial County was classified as moderate nonattainment for the PM_{10} NAAQS under CAA sections 107(d)(4)(B) and 188(a). By November 15, 1991, such areas were required to develop and submit State Implementation Plan (SIP) revisions providing for, among other things, implementation of reasonably available control measures (RACM).

Partly to address the RACM requirement, ICAPCD adopted local Regulation VIII rules to control PM_{10} from sources of fugitive dust on October 10, 1994, and revised them on November 25, 1996. USEPA did not act on these versions of the rules with respect to the federally enforceable SIP.
On August 11, 2004, USEPA reclassified Imperial County as a serious nonattainment area for

PM_{10}. As a result, CAA section 189(b)(1)(B) required all BACM to be implemented in the area within four years of the effective date of the reclassification, i.e., by September 10, 2008.

On November 8, 2005, partly to address the BACM requirement, ICAPCD revised the Regulation VIII rules to strengthen fugitive dust requirements. On July 8, 2010, USEPA finalized a limited approval of the 2005 version of Regulation VIII, finding that the seven Regulation VIII rules largely fulfilled the relevant CAA requirements. Simultaneously, USEPA also finalized a limited disapproval of several of the rules, identifying specific deficiencies that needed to be addressed to fully demonstrate compliance with CAA requirements regarding BACM and enforceability.

In September 2010, ICAPCD and the California Department of Parks and Recreation (DPR) filed petitions with the Ninth Circuit Federal Court of Appeals for review of USEPA's limited disapproval of the rules. After hearing oral argument on February 15, 2012, the Ninth Circuit directed the parties to consider mediation before rendering a decision on the litigation. On July 27, 2012, ICAPCD, DPR and USEPA reached agreement on a resolution to the dispute which included a set of specific revisions to Regulation VIII. These revisions are reflected in the version of Regulation VIII adopted by ICAPCD on October 16, 2012 and approved by USEPA April 22, 2013. Since 2006 ICAPCD had implemented regulatory measures to control emissions from fugitive dust sources and open burning in Imperial County

FIGURE 4-1
REGULATION VIII GRAPHIC TIMELINE DEVELOPMENT

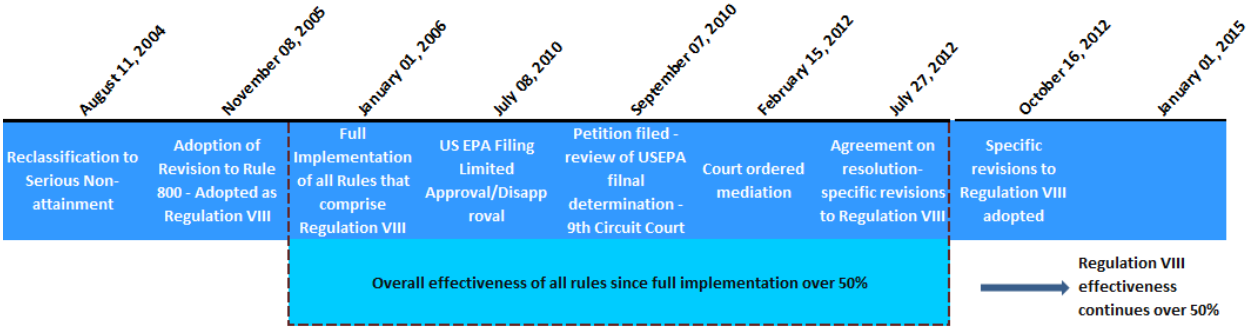


Fig 4-1: Regulation VIII Graphic Timeline

IV.1.a Control Measures

Below is a brief summary of Regulation VIII, which is comprised of seven fugitive dust rules. **Appendix D** contains a complete set of the Regulation VIII rules.

ICAPCD's Regulation VIII consists of seven interrelated rules designed to limit emissions of PM_{10} from anthropogenic fugitive dust sources in Imperial County.

Rule 800, General Requirements for Control of Fine Particulate Matter, provides definitions, a compliance schedule, exemptions and other requirements generally applicable to all seven rules. It requires the United States Bureau of Land Management (BLM), United States Border Patrol

(BP) and DPR to submit dust control plans (DCP) to mitigate fugitive dust from areas and/or activities under their control. Appendices A and B of Rule 800 describe methods for determining compliance with opacity and surface stabilization requirements in Rules 801 through 806.

Rule 801, Construction and Earthmoving Activities, establishes a 20% opacity limit and control requirements for construction and earthmoving activities. Affected sources must submit a DCP and comply with other portions of Regulation VIII regarding bulk materials, carry-out and track-out, and paved and unpaved roads. The rule exempts single family homes and waives the 20% opacity limit in winds over 25 mph under certain conditions.

Rule 802, Bulk Materials, establishes a 20% opacity limit and other requirements to control dust from bulk material handling, storage, transport and hauling.

Rule 803, Carry-Out and Track-Out, establishes requirements to prevent and clean-up mud and dirt transported onto paved roads from unpaved roads and areas.

Rule 804, Open Areas, establishes a 20% opacity limit and requires land owners to prevent vehicular trespass and stabilize disturbed soil on open areas larger than 0.5 acres in urban areas, and larger than three acres in rural areas. Agricultural operations are exempted.
Rule 805, Paved and Unpaved Roads, establishes a 20% opacity limit and control requirements for unpaved haul and access roads, canal roads and traffic areas that meet certain size or traffic thresholds. It also prohibits construction of new unpaved roads in certain circumstances. Single-family residences and agricultural operations are exempted.

Rule 806, Conservation Management Practices, requires agricultural operation sites greater than 40 acres to implement at least one conservation management practice (CMP) for each of several activities that often generate dust at agricultural operations. In addition, agricultural operation sites must prepare a CMP plan describing how they comply with Rule 806, and must make the CMP plan available to the ICAPCD upon request.

IV.1.b Additional Measures

Imperial County Natural Events Action Plan (NEAP)

On August 2005, the ICAPCD adopted a NEAP for the Imperial County, as was required under the former USEPA Natural Events Policy, to address PM_{10} events by:

- Protecting public health;
- Educating the public about high wind events;
- Mitigating health impacts on the community during future events; and
- Identifying and implementing BACM measures for anthropogenic sources of windblown dust.

Smoke Management Plan (SMP) Summary

There are 35 Air Pollution Control Districts or Air Quality Management Districts in California which are required to implement a district-wide smoke management program. The regulatory basis for California's Smoke Management Program, codified under Title 17 of the California Code of Regulations is the "Smoke Management Guidelines for Agricultural and Prescribed Burning" (Guidelines). California's 1987 Guidelines were revised to improve interagency coordination, avoid smoke episodes, and provide continued public safety while providing adequate opportunity for necessary open burning. The revisions to the 1987 Guidelines were approved March 14, 2001. All air districts, with the exception of the San Joaquin Valley Air Pollution Control District (SJAPCD) were required to update their existing rules and Smoke Management Plans to conform to the most recent update to the Guidelines.

Section 80150 of Title 17 specifies the special requirements for open burning in agricultural operations, the growing of crops and the raising of fowl or animals. This section specifically requires the ICAPCD to have rules and regulations that require permits that contain requirements that minimize smoke impacts from agricultural burning.

On a daily basis, the ICAPCD reviews surface meteorological reports from various airport agencies, the NWS, State fire agencies and CARB to help determine whether the day is a burn day. Using a four-quadrant map of Imperial County allowed burns are allocated in such a manner as to assure minimal to no smoke impacts safeguarding the public health. Finally, all permit holders are required to notice and advise members of the public of a potential burn. This noticing requirement is known as the Good Neighbor Policy. On May 20, 2014 the ICAPCD declared a No Burn day **(Appendix A).** No complaints were filed for agricultural burning on May 20, 2014.

IV.1.c Review of Source-Permitted Inspections and Public Complaints

A query of the ICAPCD permit database was compiled and reviewed for active permitted sources throughout Imperial County and specifically around Brawley during the May 20, 2014 PM_{10} exceedance. Both permitted and non-permitted sources are required to comply with Regulation VIII requirements that address fugitive dust emissions. The identified permitted sources are Aggregate Products, Inc., US Gypsum Quarry, Imperial Aggregates (Val-Rock, Inc., and Granite Construction), US Gypsum Plaster City, Clean Harbors (Laidlaw Environmental Services), Bullfrog Farms (Dairy), Burrtec Waste Industries, Border Patrol Inspection station, Centinela State Prison, various communications towers not listed and various agricultural operations. Non-permitted sources include the wind farm known as Ocotillo Express, and a solar facility known as CSolar IV West. Finally, the desert regions are under the jurisdiction of the Bureau of Land Management and the California Department of Parks (Including Anza Borrego State Park and Ocotillo Wells).

An evaluation of all inspection reports, air quality complaints, compliance reports, and other documentation indicate no evidence of unusual anthropogenic-based PM_{10} emissions. There were no complaints filed on May 20, 2014, officially declared as a No Burn day, related to agricultural burning, waste burning or dust.

FIGURE 4-2
PERMITTED SOURCES

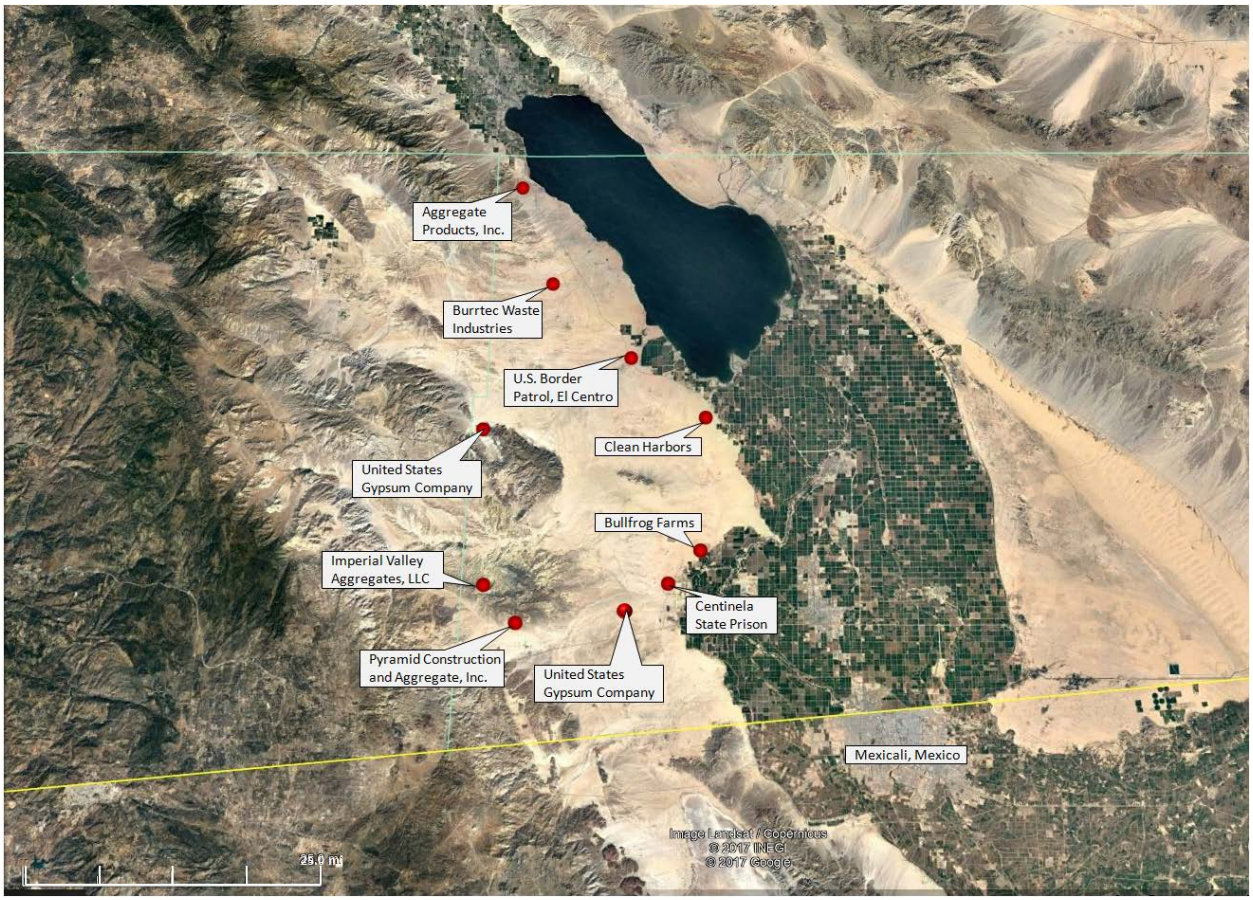


Fig 4-2: The above map identifies those permitted sources located west, northwest and southwest of the Brawley monitor. The green line to the north denotes the political division between Imperial and Riverside counties. The yellow line below denotes the international border between the United States and Mexico. The green checker-boarded areas are a mixed use of agricultural and community parcels. In addition, either the Bureau of Land Management or the California Department of Parks manages the desert areas. Base map from Google Earth

FIGURE 4-3
NON-PERMITTED SOURCES

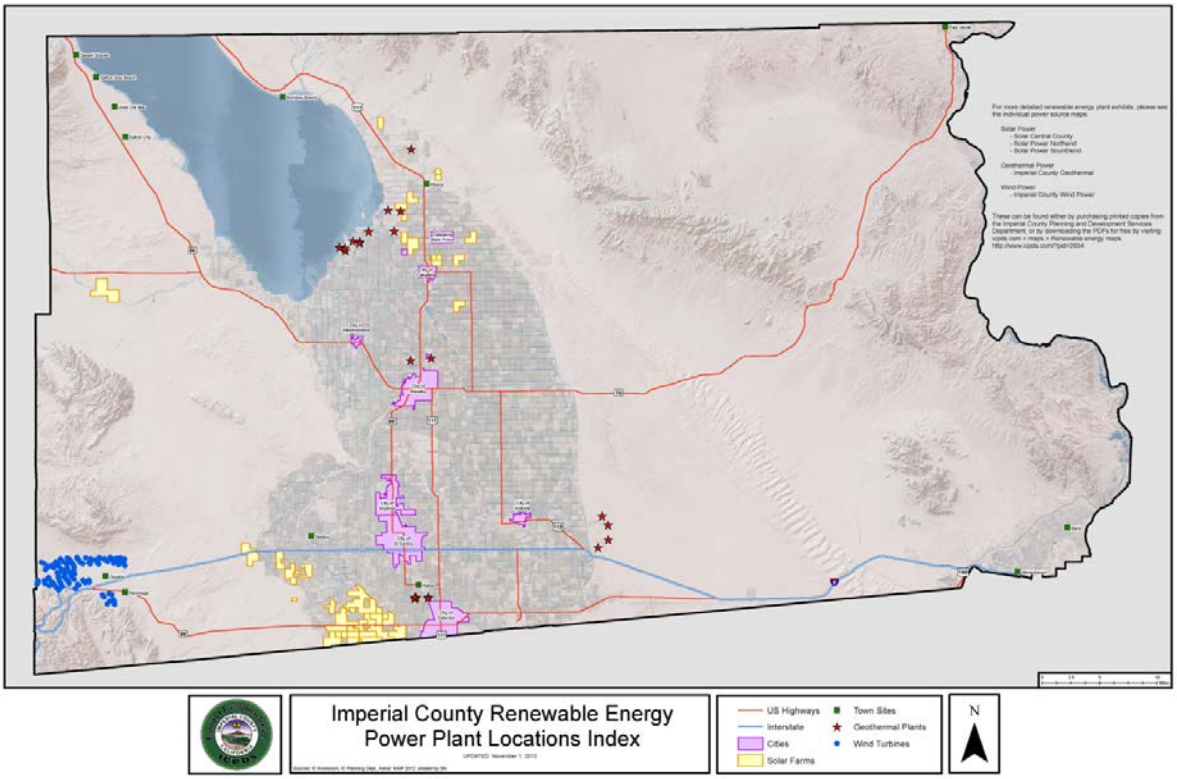


Fig 4-3: The above map identifies those power sources located west, northwest and southwest of the Brawley monitor. Blue indicate the Wind Turbines, Yellow are the solar farms and stars are geothermal plants

IV.2 Forecasts and Warnings

As explained above, the NWS office in San Diego and Phoenix issued 13 notices, in response to moving upper low, in the form of Urgent Weather Messages, Preliminary Local Storm Reports, and Hazardous Weather Outlooks. As described, an upper low moved toward southern California as early as the evening hours of Sunday, May 18, 2014 with strong southwesterly winds aloft combining with onshore pressure gradients producing winds along the desert slopes of the San Diego Mountains and deserts. These notices contained wind advisories, effective through Tuesday, May 20, 2014 identifying westerly winds 20 to 30 mph with gusts up to 45 mph near mountain ridge tops and desert mountain slopes with the strongest gusts along the northern Coachella Valley and along the desert slopes of the San Diego Mountains and Imperial County. **Appendix A** contains pertinent copies of all notices to the May 20, 2014 event.

IV.3 Wind Observations

Wind data during the event were available from airports in eastern Riverside County, southern San Diego County, southwestern Yuma County (Arizona), northern Mexico, and Imperial County. Both Imperial Airport (KIPL) and El Centro NAF (KNJK) measured multiple hours of winds 25 mph or greater on both May 19, 2014 and May 20, 2014. Gusts at both airports were over 30 mph on both days. El Centro NAF measured a maximum gust of 47 mph on May 20, 2014. See **Table 2-2**. Wind speeds of over 25 mph are normally sufficient to overcome most PM_{10} control measures. During the May 20, 2014 event, wind speeds were above the 25-mph threshold overcoming the BACM in place.

IV.4 Summary

The weather and air quality forecasts and warnings outlined in this section demonstrate that strong winds associated with an upper-level trough that moved over southern California transported windblown dust that caused uncontrollable PM_{10} emissions. The BACM list as part of the control measures in Imperial County for fugitive dust emissions were in place at the time of the event. These control measures are required for areas designated as "serious" non-attainment for PM_{10}, such as Imperial County. Thus, the BACM in place at the time of the event were beyond reasonable. In addition, surface wind measurements in the Brawley and surrounding areas to the west of Brawley during the event were high enough (at or above 25 mph, with wind gusts over 35 mph) that BACM PM_{10} control measures would have been overwhelmed.

Finally, a high wind dust event can be considered as a natural event, even when portions of the wind-driven emissions are anthropogenic, as long as those emissions have a clear causal relationship to the event and were determined to be not reasonably controllable or preventable. This demonstration has shown that the event that occurred on May 20, 2014 was not reasonably controllable or preventable despite the strong and in force BACM within the affected areas in Imperial County. This demonstration has similarly established a clear causal relationship between the exceedance and the high wind event timeline and geographic location. The May 20, 2014 event can be considered an exceptional event under the requirements of the exceptional event rule.

V Clear Causal Relationship

V.1 Discussion

Meteorological observations for May 20, 2014 identified an upper-level trough that brought strong, gusty westerly winds across the San Diego Mountains and desert slopes of southeast California. The trough strengthened a low-pressure system situated over southern Nevada, leading to the tightening of pressure gradients and gusty winds over the region.

As discussed above, the San Diego NWS office described the upper low as moving toward southern California as early as the evening hours of Sunday, May 18, 2014.[12] Strong westerly winds aloft combined with onshore pressure gradients produced winds in the mountains and deserts. By May 19, 2014, the San Diego NWS office described a potent closed upper low over the northern California coast. By 1350, PST May 20, 2014 the upper level low shifted slowly inland across central California. This kept southern California under the southwesterly flow aloft with most of the mountains and desert locations gusting between 35 and 45 mph.[13] Although onshore gradients weakened a bit by 1800 PST areas of gusty westerly winds continued along and below the desert slopes of the San Diego mountains.[14]

Entrained windblown dust from natural areas, particularly from the desert area and anthropogenic sources controlled with BACM, is confirmed by the meteorological and air quality observations on May 20, 2014. The gusty westerly winds that moved across the San Diego Mountains and desert slopes were responsible for the exceptional event that affected the Brawley monitor on May 20, 2014. The meteorological event brought gusty westerly winds affected a large portion of southern California, including the Imperial County.

Figures 5-1 and 5-2 provide information regarding the exceptional event that occurred May 20, 2014.

[12] Area Forecast Discussion National Weather Service San Diego CA 830 PM PST (930 PM PDT), Sunday, May 18, 2014.
[13] Area Forecast Discussion National Weather Service San Diego CA 1250 PM PST (150 PM PDT), Tuesday, May 20, 2014.
[14] Area Forecast Discussion National Weather Service San Diego CA 726 PM PST (826 PM PDT), Tuesday, May 20, 2014.

FIGURE 5-1
AQUA MODIS SATELLITE IMAGE MAY 20, 2014

Fig 5-1: A MODIS Aqua satellite image (~13:30 PST) on May 20, 2014 captures a mixture of clouds and dust over Imperial County. MODIS image through AirNow Tech Navigator

FIGURE 5-2
GOES E-W SATELLITE IMAGES MAY 19, 2014 AND MAY 20, 2014

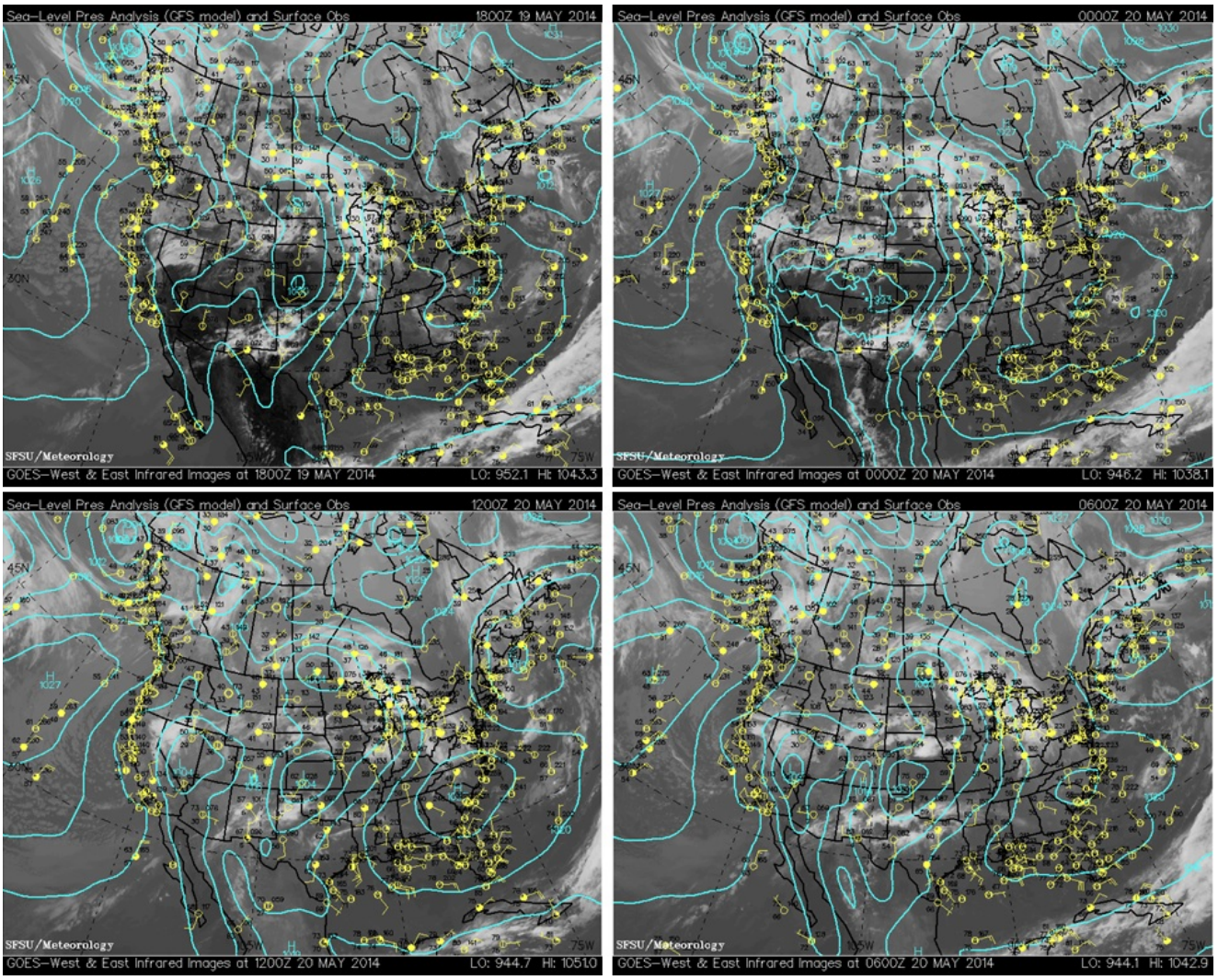


Fig 5-2: GOES satellites show the tightening and relaxing of the pressure gradient that led to the gusty westerly winds over the region. Clockwise, from top left: 1000 PST on May 19, 2014; 1600 PST May 19, 2014; 2200 PST May 19, 2014; 0400 PST May 20, 2014. The bottom right image displays the low pressure over southern Nevada. The tightening of the pressure gradient is clearly visible in the top right image coincident with the gusty westerly winds. Source: SFSU Department of Earth & Climate Sciences and the California Regional Weather Server; http://squall.sfsu.edu/crws/archive/wcsathts_arch.html

Figure 5-3 is a satellite image of aerosols drifting over Imperial County. Warmer colors indicate increasing Aerosol Optical Depth (AOD)[15] thickness.

[15] Aerosol Optical Depth (AOD) (or Aerosol Optical Thickness) indicates the level at which particles in the air (aerosols) prevent light from traveling through the atmosphere. Aerosols scatter and absorb incoming sunlight, which reduces visibility. From an observer on the ground, an AOD of less than 0.1 is "clean" - characteristic of clear blue sky, bright sun and maximum visibility. As AOD increases to 0.5, 1.0, and greater than 3.0, aerosols become so dense that sun is obscured. Sources of aerosols include

FIGURE 5-3
AEROSOL OPTICAL DEPTH MAY 19, 2014 AND MAY 20, 2014

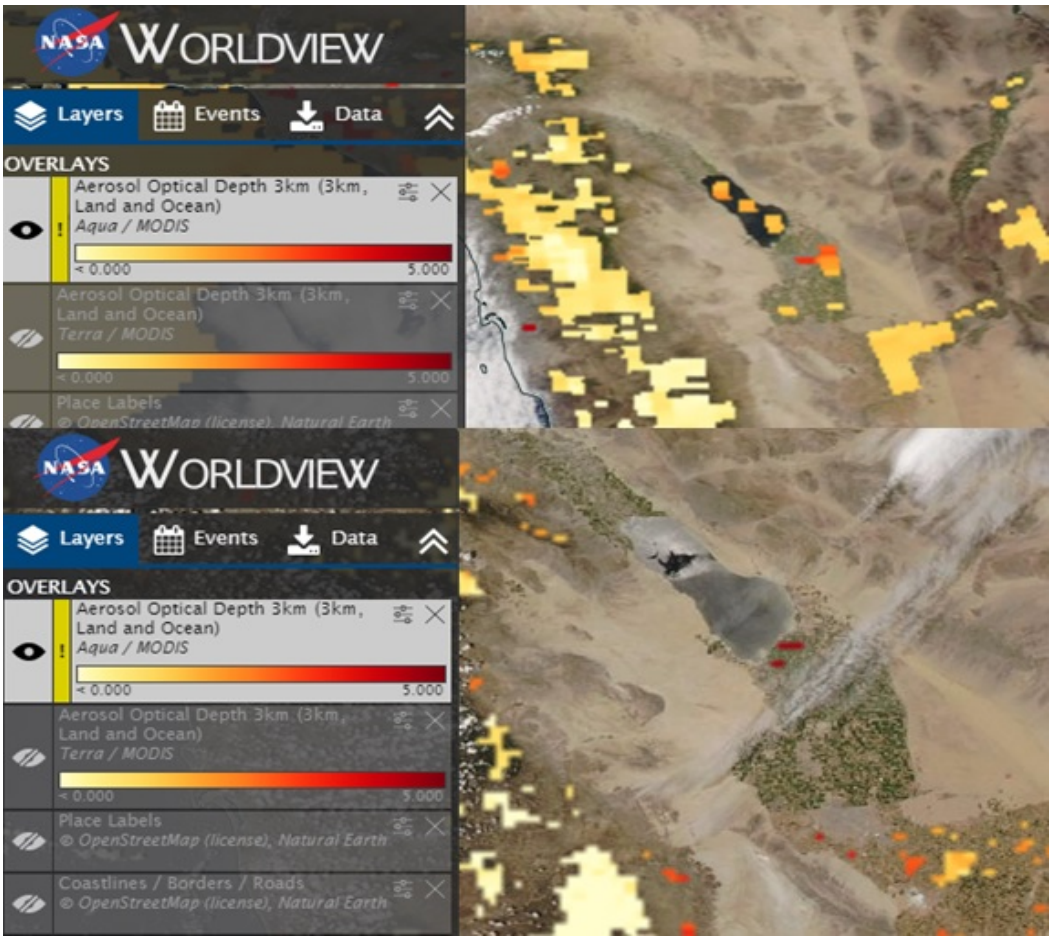


Fig 5-3: Aerosol Optical Depth (AOD) as captured by the MODIS Aqua satellite on May 19, 2014 (top) and May 20, 2014 (bottom). The wider view of May 19, 2014 shows AOD scattered over a wide area of southeastern California. The closer view on May 20, 2014 shows dense AOD over the southeastern edge of the Salton Sea. Source: NASA Worldview; https://worldview.earthdata.nasa.gov

A Smoke Text Product released by NOAA's Satellite Service Division on May 19, 2014 valid through 1830 PST (0230Z May 20, 2014) provides additional evidence of windblown dust in southeastern California. The product identifies plumes of blowing dust and sand moving eastward in Borrego Springs. **Appendix A** contains copies of all pertinent notices to the May 20, 2014 event.

pollution from factories, smoke from fires, dust from dust storms, sea salt, and volcanic ash and smog. Aerosols compromise human health when inhaled by people, particularly those with asthma or other respiratory illnesses. Source: https://worldview.earthdata.nasa.gov. MODIS (or Moderate Resolution Imaging Spectroradiometer) is a key instrument aboard the Terra (originally known as EOS AM-1) and Aqua (originally known as EOS PM-1) satellites. Terra's orbit around the Earth is timed so that it passes from north to south across the equator in the morning, while Aqua passes south to north over the equator in the afternoon. MODIS Technical Specifications identify the Terra orbit at 10:30am and the Aqua at 1:30pm (Appendix A).

The EPA accepts a high wind threshold for sustained winds of 25 mph in California and 12 other states.[16] **Table 5-1** provides a temporal relationship of wind speeds, wind direction, wind gusts (if available), and PM_{10} concentrations at the Brawley monitor. As illustrated in **Table 5-1**, hourly time slots for the Brawley monitor with elevated PM_{10} concentrations (shown in red bold text) are strongly correlated to high average wind speeds and high-speed gusts (typically above 25 mph) at nearby regional meteorological stations, indicating these elevated wind speeds caused an exceedance of the NAAQS at the Brawley monitor on May 20, 2014.

TABLE 5-1
WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR BRAWLEY MAY 20, 2014

DESERT RESORTS RGNL AIRPORT				EL CENTRO NAF				IMPERIAL COUNTY AIRPORT				BRAWLEY	
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	PM_{10} (µg/m³)
0	**21**	29	320	0	**14**	18	230	0	**15**		290	0	**461**
100	**10**	20	310	100	**23**		250	100	**17**	23	240	100	**170**
200	10		310	200	20	30	260	200	11		240	200	89
300	**11**	18	0	300	**13**	34	240	300	**15**	28	250	300	**200**
400	16		90	400	24	33	270	400	20		280	400	90
500	**13**		330	500	**8**		280	500	**11**	28	310	500	**195**
600	**15**		330	600	**22**		280	600	**11**		300	600	**162**
700	16		10	700	18		300	700	13		300	700	94
800	17		10	800	21	28	290	800	15		280	800	74
900	**15**		10	900	**28**		280	900	**16**	28	280	900	**817**
1000	9	22	360	1000	30	38	260	1000	21	31	290	1000	85
1100	**11**	23	30	1100	**33**	39	270	1100	**28**	34	260	1100	**124**
1200	**18**	37	30	1200	**32**		260	1200	**25**	36	280	1200	**475**
1300	**17**	25	10	1300	**37**	43	260	1300	**25**	36	270	1300	**219**
1400	**18**	25	20	1400	**30**	39	250	1400	**25**	38	270	1400	**111**
1500	18	28	20	1500	31	39	230	1500	25	38	260	1500	87
1600	16		10	1600	31	37	240	1600	21	29	260	1600	79
1700	11		30	1700	34	43	250	1700	20		260	1700	75
1800	**14**		30	1800	**31**	40	250	1800	**25**	36	260	1800	**153**
1900	**7**		240	1900	**25**	36	260	1900	**17**	29	250	1900	**225**
2000	**13**		200	2000	**40**	47	260	2000	**25**	38	270	2000	**546**
2100	**22**	29	340	2100	**22**	32	270	2100	**22**	32	280	2100	**934**
2200	**20**	31	320	2200	**18**		260	2200	**15**		270	2200	**189**
2300	**25**	32	330	2300	**29**		260	2300	**11**	24	300	2300	**367**

Wind data for KIPL, KNJK and Desert Resorts airport from the NCEI's QCLCD system. Wind speeds = mph; Direction = degrees

Table 5-1: Wind speed, wind gust, and wind direction tables for Desert Resorts Regional Airport, El Centro NAF, and Imperial County Airport comparative to the concentration of the Brawley FEM Monitor on May 20, 2014. Values indicated in red are wind speed values coincident with the Brawley FEM Monitor measured PM_{10} concentrations above 100 µg/m³. Collected meteorological observations are from a variety of sources with varying equipment and exposure. **Appendix B** contains additional information regarding meteorological observations

Figure 5-4 is a graphical illustration of the meteorological elements on May 20, 2014. As early, as May 19, 2014 measured gusty westerly winds at the Imperial County Airport (KIPL), the El Centro NAF (KNJK) and the Jacqueline Cochran (Desert Resorts) airport (KTRM) elevated PM_{10}

[16] "Treatment of Data Influenced by Exceptional Events; Final Guidance", FR Vol. 81, No. 191, 68279, October 3, 2016

concentrations at the Brawley and Niland monitors during the afternoon to evening hours of May 19, 2014. Windblown dust remained suspended through the early morning hours of May 20, 2014 allowing for elevated concentrations from mid-morning to evening hours. Although winds during the morning and evening hours maintained a predominantly northwesterly direction, suspended windblown dust throughout the day affected concentrations at the Brawley and Niland monitors on May 20, 2014. Measured gusty winds at upstream sites allowed for transported windblown dust from the natural open areas located within the mountain and desert slopes west of Imperial County causing an exceedance at the Brawley monitor.

Finally, although the Niland monitor measured elevated PM_{10} concentrations on May 20, 2014, the monitor failed to meet critical criterial requirements that caused the invalidation of four hours of measured concentrations during the 1700 PST hour through 2000 PST hour. Had the Niland monitor not failed to meet the critical criteria it is very likely that Niland monitor would have measured an exceedance of the NAAQS.

FIGURE 5-4
BRAWLEY EXCEEDANCE FACTORS TIMELINE

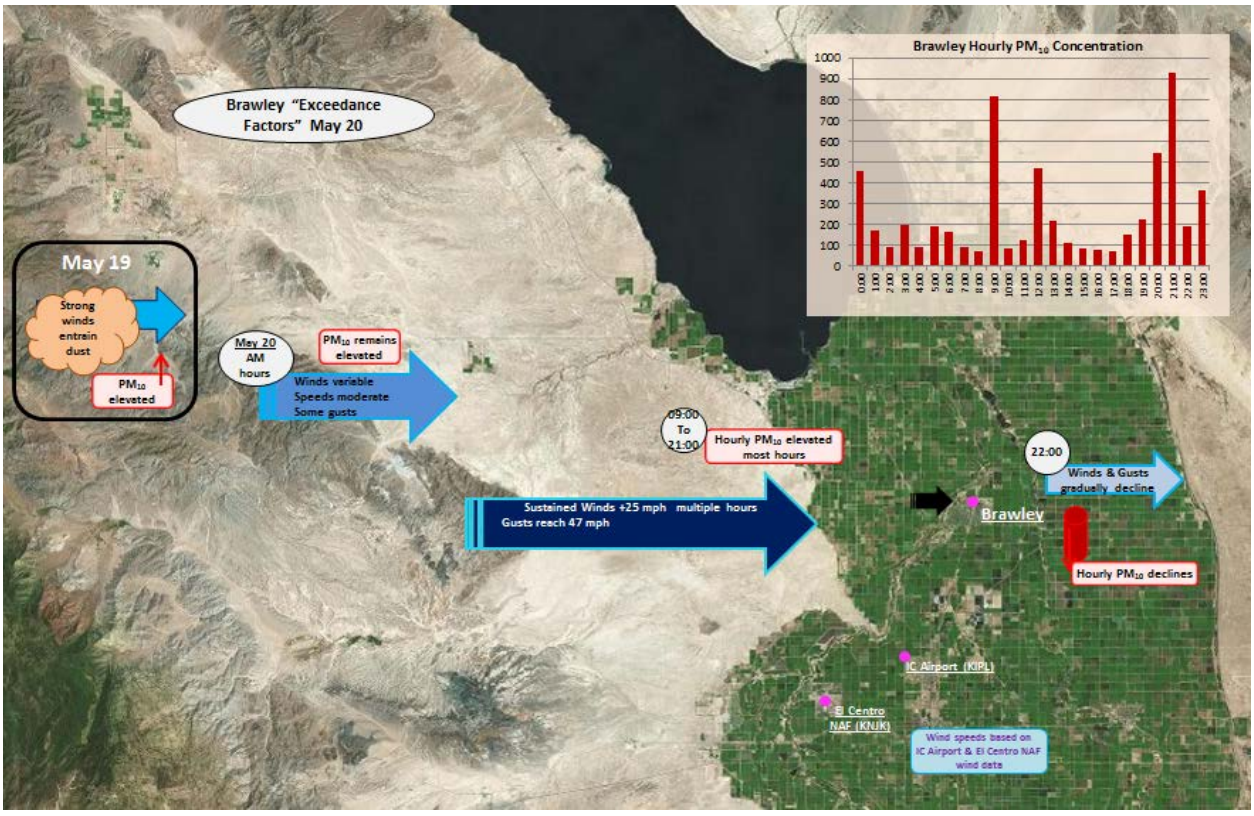


Fig 5-4: The wind event moved towards southern California as early as the evening hours of May 18, 2014. As the system moved inland, strong, gusty winds measured at local airports elevated particularly during the late to evening hours of May 19, 2014 and through May 20, 2014 caused an exceedance on May 20, 2014 at the Brawley monitor. Air quality data is from the EPA's AQS data bank. Wind data from the NCEI's QCLCD data bank. Base map from Google Earth

Figure 5-5 demonstrates the relationship between the gusty westerly winds and the hourly PM_{10} concentrations at the Brawley monitor. The correlation of hourly concentration data from the Brawley monitor and the elevated wind speeds on May 20, 2014 indicates that as wind speeds increased so did concentrations. The peak hourly PM_{10} concentrations at Brawley occurred during the 0900 PST, 1200 PST and the 2100 PST hour, coincident with continued elevated winds. **Appendix C** contains additional graphs illustrating the relationship between the high PM_{10} concentrations and increased wind speeds at other monitoring sites within Imperial, Riverside, and Yuma (Arizona) counties on May 20, 2014.

FIGURE 5-5
BRAWLEY PM_{10} CONCENTRATIONS AND WIND SPEEDS ON MAY 20, 2014

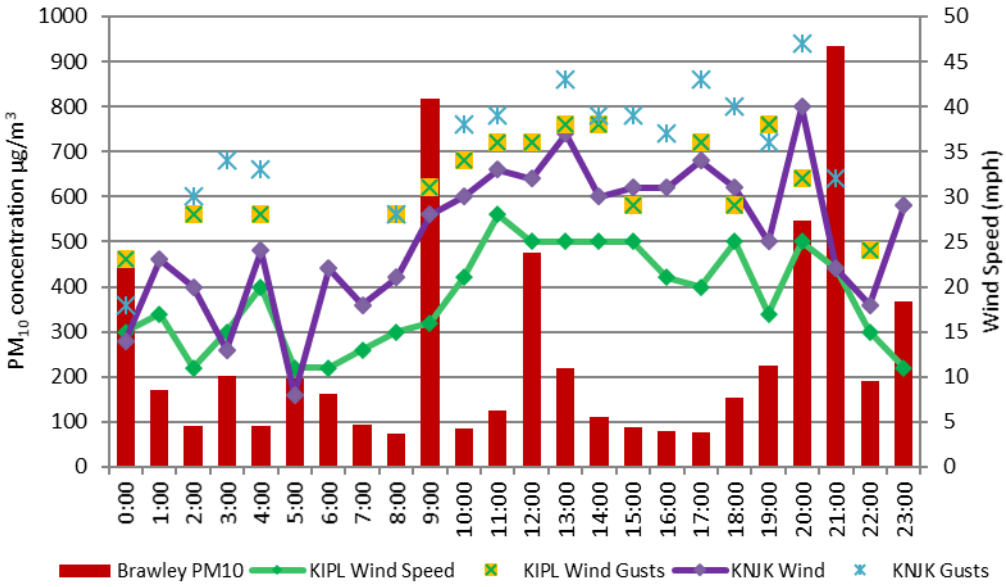


Fig 5-5: The graph illustrates the correlation of the Brawley PM_{10} concentrations and the gusty westerly winds. Both airports had multiple hours of winds above 25 mph on May 19, 2014 and May 20, 2014. Air quality data is from the EPA's AQS data bank. Wind data is from the NCEI's QCLCD data bank

Figures 5-6 through 5-9 illustrates the elevated winds and PM_{10} concentrations for three days, May 19, 2014 through May 21, 2014. The correlation of hourly measured concentrations at the Brawley monitor and the elevated wind speeds on May 20, 2014 indicate that as wind speeds increased so did concentrations of PM_{10}. The peak hourly PM_{10} concentrations on May 20, 2014 are associated with continued gusty westerly winds and reduced visibility. As winds began to subside during late evening on May 20, 2014 so did concentrations.

FIGURE 5-6
72 HOUR WIND COMPARISON OF NEIGHBORING SITES

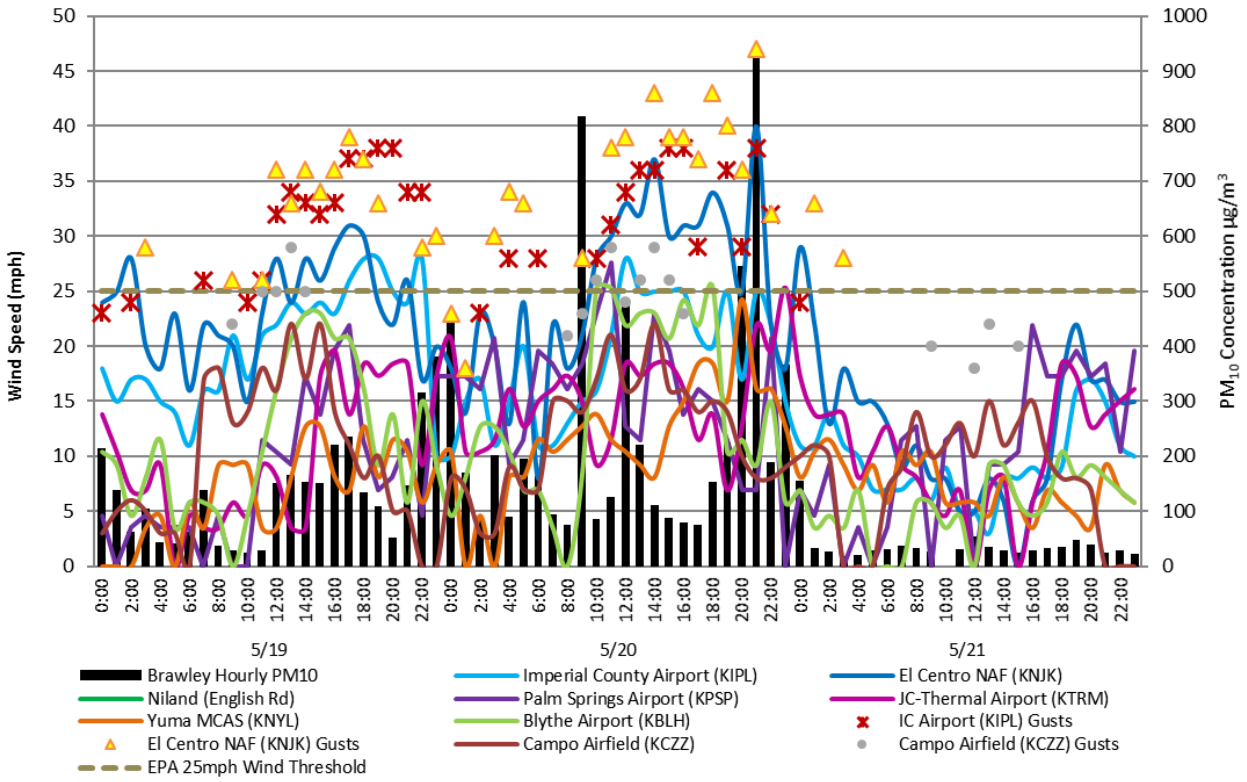


Fig 5-6: Meteorological data collected from ten sites within the Imperial, Riverside and Yuma Counties over a 3-day period from May 19, 2014 to May 21, 2014 illustrates a uniform spike in wind speed during the May 20, 2014 exceptional event. Wind data from the NCEI's QCLCD data bank; EPA's AQS; and the University of Utah's Mesowest

FIGURE 5-7
BRAWLEY PM_{10} CONCENTRATION & WIND SPEED MAY 19, 2014 TO MAY 21, 2014

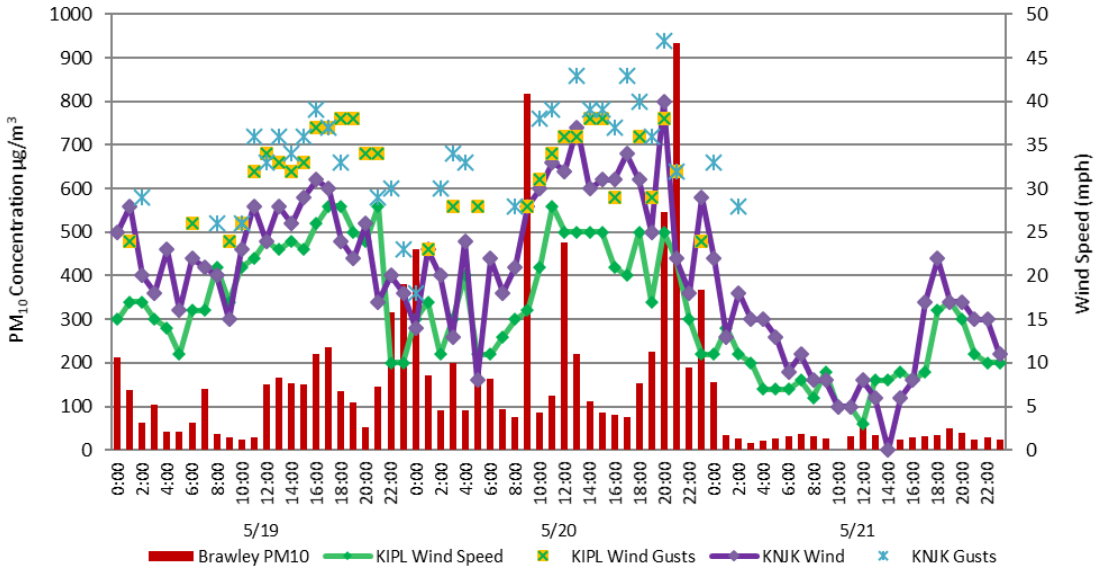


Fig 5-7: The graphical image illustrates the correlation between elevated PM_{10} concentrations and wind speeds. Air quality data is from the EPA's AQS data bank. Wind data is from the NCEI's QCLCD data bank

FIGURE 5-8
72 HOUR PM_{10} CONCENTRATIONS AND UPSTREAM WIND SPEEDS

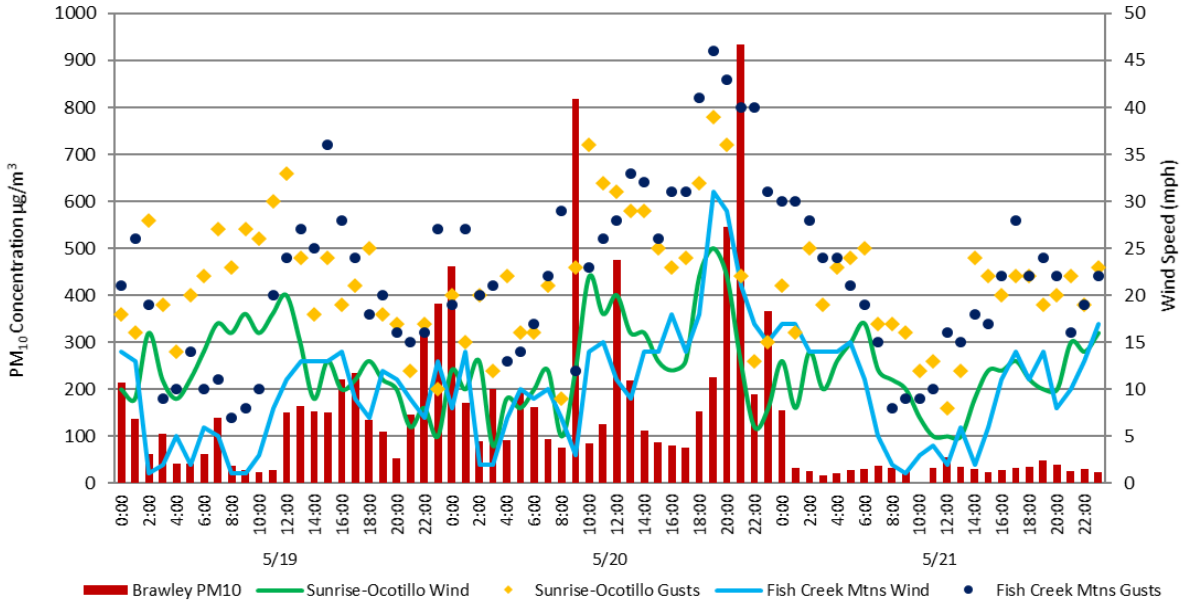


Fig 5-7: A graphical representation of elevated PM_{10} concentrations and elevated wind speeds at upstream sites. Air quality data is from the EPA's AQS data bank. Wind data is from the MesoWest data bank

Figure 5-9 shows the observed visibility at El Centro NAF (KNJK) and the hourly PM_{10} concentrations at Brawley. Minimum visibility at the airport was limited to six miles at 2056 PST on May 20, 2014 consistent with observed dust.

FIGURE 5-9
72 HOUR PM_{10} CONCENTRATIONS AND VISIBILITY
EL CENTRO NAF (KNJK)

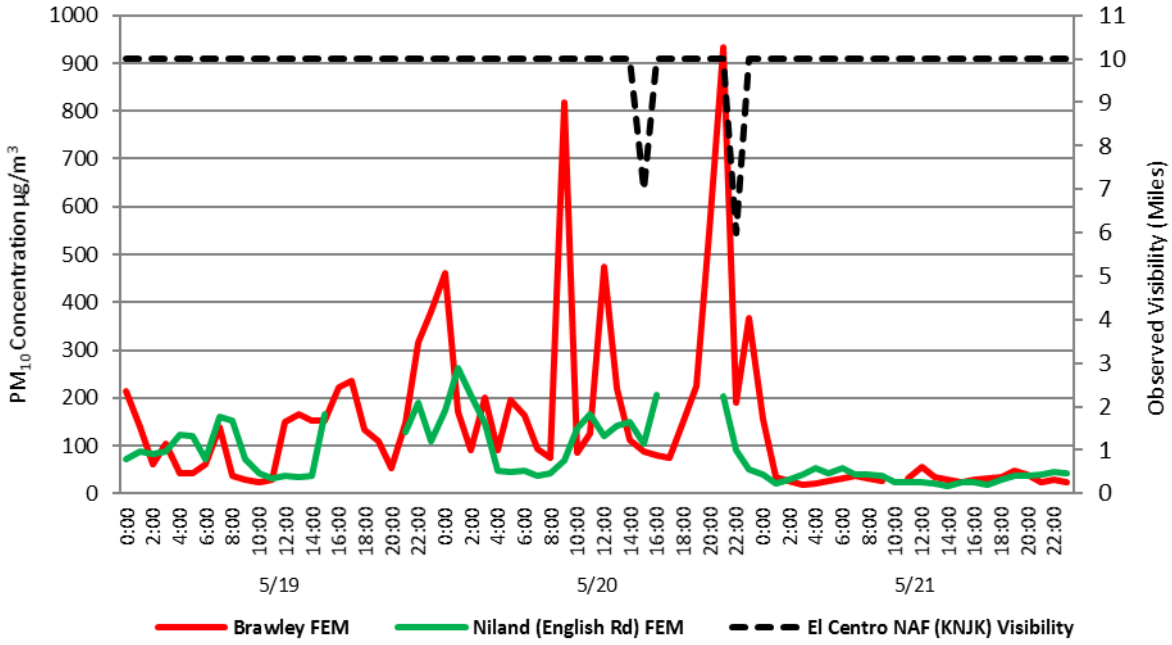


Fig 5-9: Visibility as reported from the El Centro NAF (KNJK) reduced to six miles during the 2000 PST hour on May 20, 2014 coincident with observed dust. Air quality is data from the EPA's AQS data bank. Visibility data is from the NCEI's QCLCD data bank

Both the Niland and Calexico meteorological stations **(Appendix B)** to the north and south of Brawley measured elevated winds on May 20, 2014. May 20, 2014 was not a scheduled run day, thus it is unclear whether the Westmorland, Calexico or the El Centro monitors would have exceeded the NAAQS.

As explained above, the NWS office in San Diego and Phoenix issued 13 notices in the form of Urgent Weather Messages, Preliminary Local Storm Reports, and Hazardous Weather Outlooks. These notices contained wind advisories, effective through Tuesday, May 20, 2014 identifying westerly winds 20 to 30 mph with gusts up to 45 mph near mountain ridge tops and desert mountain slopes with the strongest gusts along the northern Coachella Valley and along the desert slopes of the San Diego Mountains and Imperial County. A useful measurement of the degradation of air quality is the Air Quality Index (AQI).[17]

[17] The AQI is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health affects you may experience within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these

Figure 5-10 provides the resultant AQI for May 20, 2014. As the upper level low moved inland the level of reduced air quality can be ascertained when the AQI goes from "Yellow" or a moderate level to "Red" or an unhealthy level. As the gusty westerly winds affect Imperial County on May 20, 2014, windblown dust causes elevated concentrations and reduced air quality. **Appendix A** contains copies of notice pertinent to the May 20, 2014 event.

FIGURE 5-10
AIR QUALITY INDEX FOR BRAWLEY MAY 20, 2014

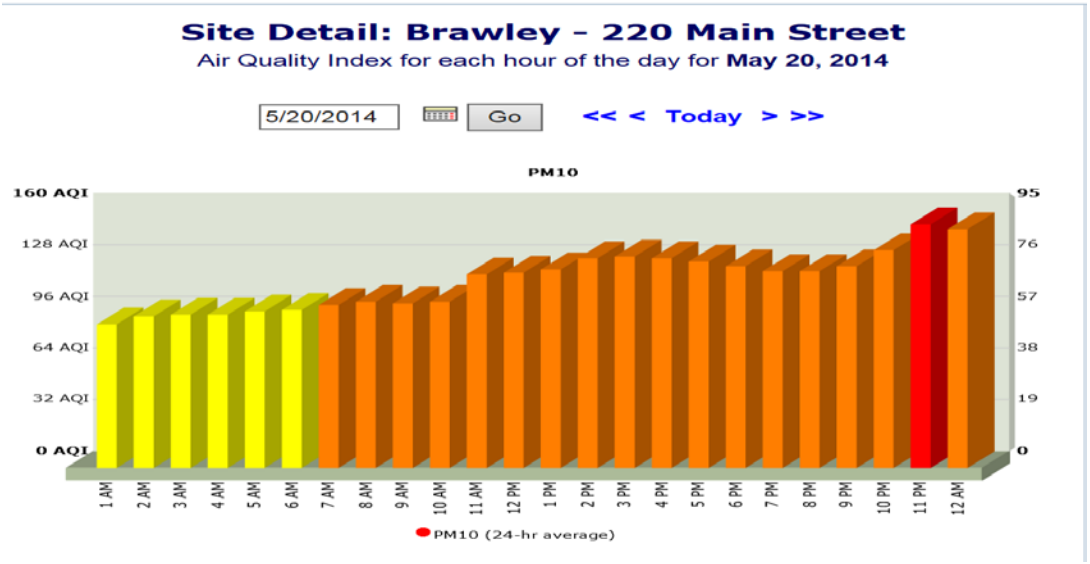


Fig 5-10: Reduced air quality is evident when warnings go from yellow or a moderate level to red or an unhealthy level. Source: ICAPCD

V.2 Summary

The preceding discussion, graphs, figures, and tables provide wind direction, speed and concentration data illustrating the spatial and temporal effects of the gusty westerly winds associated with the upper level low that moved towards southern California on May 20, 2014. The information provides a clear causal relationship between the transported windblown dust and the PM_{10} exceedance measured at the Brawley monitor on May 20, 2014. Furthermore, the wind advisories and issued air quality alert illustrate the effect upon air quality within the region extending from all of Imperial County and the southern portion of Riverside County to Yuma, Arizona. Large amounts of coarse particles (dust) and PM_{10} were carried aloft by strong westerly winds into the lower atmosphere. Combined, the information demonstrates that the elevated PM_{10} concentration measured on May 20, 2014 coincided with high wind speeds and that strong winds were experienced over the southern portion of Riverside County, all of Imperial County, and portions of southwestern Arizona.

pollutants, EPA has established national air quality standards to protect public health. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country.

FIGURE 5-11
MAY 20, 2014 WIND EVENT TAKEAWAY POINTS

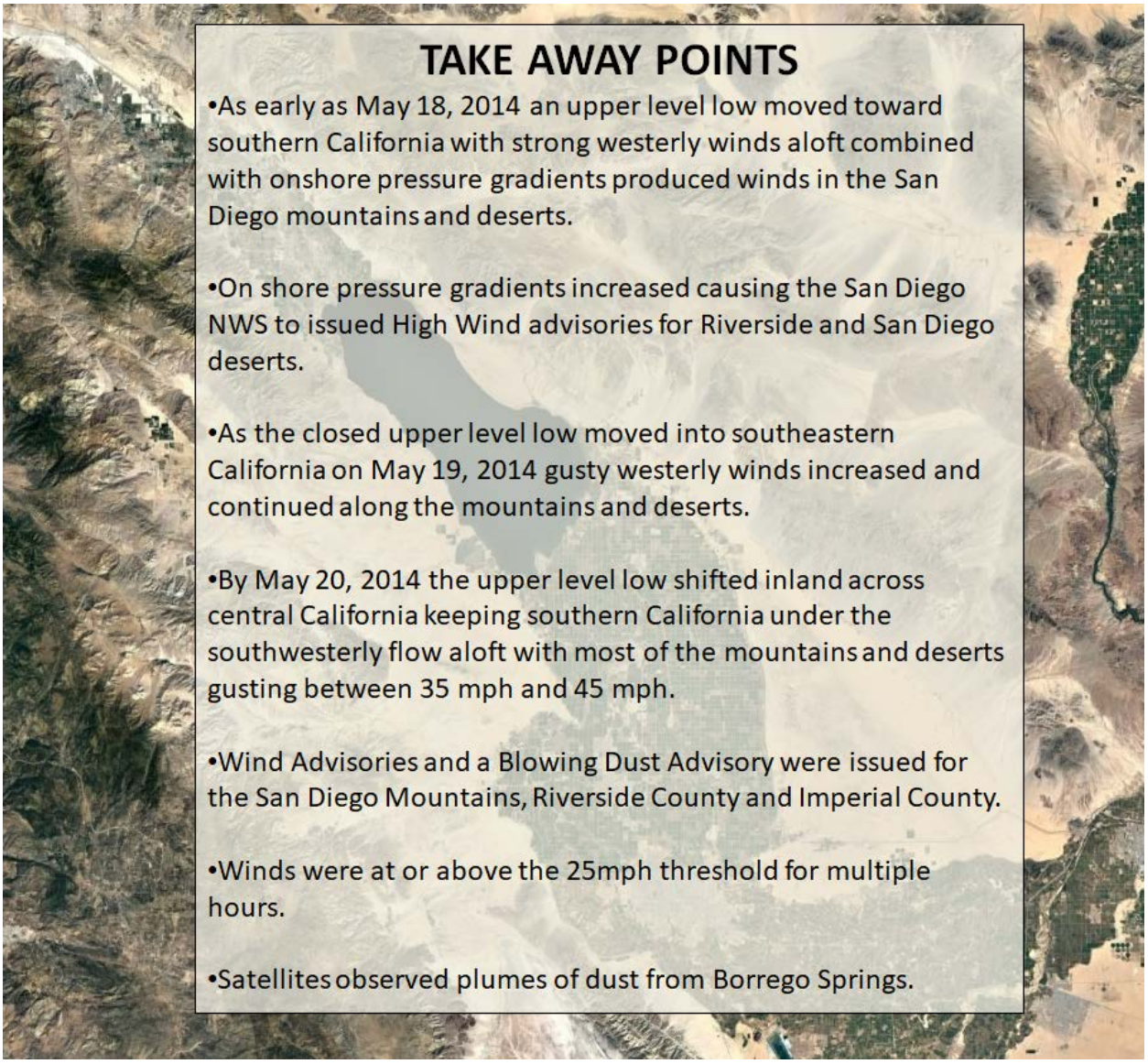


Fig 5-11: Illustrates the factors that qualify the May 20, 2014 natural event which affected air quality as an Exceptional Event

VI Conclusions

The PM_{10} exceedance that occurred on May 20, 2014, satisfies the criteria of the EER, which states that in order to justify the exclusion of air quality monitoring data evidence must be provided for the following elements:

	TABLE 6-1 TECHNICAL ELEMENTS CHECKLIST EXCEPTIONAL EVENT DEMONSTRATION FOR HIGH WIND DUST EVENT (PM_{10})	DOCUMENT SECTION
1	A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s)	5-28
2	A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation	41-52
3	Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the requirement at paragraph (c)(3)(iv)(B) of this section	29-33
4	A demonstration that the event was both not reasonably controllable and not reasonably preventable	34-40
5	A demonstration that the event was a human activity that is unlikely to recur at a particular lo cation or was a natural event	41-52

VI.1 Affects Air Quality

The preamble to the revised EER states that an event has affected air quality if the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation. Given the information presented in this demonstration, particularly Section V, we can reasonably conclude that there exists a clear causal relationship between the monitored exceedance and the May 20, 2014 event, which changed or affected air quality in Imperial County.

VI.2 Not Reasonably Controllable or Preventable

Section 50.1(j) of 40 CFR Part 50 defines an exceptional event as an event that must be "not reasonably controllable or preventable" (nRCP). The revised preamble explains that the nRCP has two prongs, not reasonably preventable and not reasonably controllable. A natural wind event, which transports dust from natural open deserts, meets the nRCP, when sources are controlled by BACM and when human activity plays little to no direct causal role. This demonstration provides evidence that despite BACM in place within Imperial County, high winds overwhelmed all BACM controls where human activity played little to no direct causal role. The

PM_{10} exceedance measured at the Brawley monitor caused by naturally occurring strong gusty west winds that transported windblown dust into Imperial County and other parts of southern California from areas located within the Sonoran Desert regions to the west of Imperial County. These facts provide strong evidence that the PM_{10} exceedance at Brawley on May 20, 2014, were not reasonably controllable or preventable

VI.3 Natural Event

The revised preamble to the EER clarifies that a "Natural Event" (50.1(k) of 40 CFR Part 50), which may recur at the same location, is an event where human activity plays little or no direct causal role. The criteria that human activity played little or no direct causal role occurs when the event, along with its resulting emissions, are solely from natural sources or where all significant anthropogenic sources of windblown dust have been reasonably controlled. As discussed within this demonstration, windblown dust anthropogenic sources reasonably controlled with BACM in and around Brawley on May 20, 2014 meet the criteria that human activity played little or no direct causal role therefore, the event qualifies as a natural event

VI.4 Clear Causal Relationship

The time series plots of PM_{10} concentrations at Brawley during different days, and the comparative analysis of different monitors in Imperial and Riverside counties demonstrates a consistency of elevated gusty westerly winds and concentrations of PM_{10} on May 20, 2014 (Section V). In addition, these time series plots and graphs demonstrate that the high PM_{10} concentrations and the gusty winds were an event that was widespread, regional and uncontrollable. Arid conditions preceding the event resulted in soils that were particularly susceptible to particulate suspension by the elevated gusty west winds. Days immediately before and after the high wind event PM_{10} concentrations were well below the NAAQS. Overall, the demonstration provides evidence of the strong correlation between the natural event and the windblown dust emissions to the exceedance on May 20, 2014.

VI.5 Historical Concentrations

The historical annual and seasonal 24-hr average PM_{10} concentrations measured at the Brawley monitor were historically unusual compared to a multi-year data set (Section III).

Appendix A: Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

This section contains issued notices by the NWS and Imperial County pertinent to the May 20, 2014 event. Along with NWS notices, this Appendix contains any issued air quality alerts. Air quality alerts advise sensitive receptors of potentially unhealthy conditions in Imperial County resulting from a natural event. On May 20, 2014, the data illustrates a region-wide increase in wind speeds and wind gusts coincident with the arrival of dust and high PM_{10} concentrations in Imperial County.

Appendix B: Meteorological Data.

This Appendix contains the time series plots, graphs, wind roses, etc. for selected monitors in Imperial and Riverside counties along with other pertinent graphs, time series plots for other areas if applicable. These plots, graphs and tables demonstrate the regional impact of the wind event.

Appendix C: Correlated PM_{10} Concentrations and Winds.

This Appendix contains the graphs depicting the correlations between PM_{10} Concentrations and elevated wind speeds for selected monitors within Imperial, Riverside, San Diego, and Yuma counties if applicable. Other areas are also included if applicable such as Mexico. These graphs demonstrate the region wide impact of the wind event.

Appendix D: Regulation VIII – Fugitive Dust Rule.

This Appendix contains a description of the compilation of the BACM adopted by the ICAPCD and approved by the USEPA. Seven rules numbered 800 through 806 comprise the set of Regulation VIII Fugitive Dust Rules.